THE DRY CLEANER AND GARMENT DYER

BY

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"The Dyer's Hand Book," and "The American Practical Dyer's Companion."

INDEX.

PAGE

Acid Color Mixing 45
For Garment Dyers 48
Alkali Blue, How to use 53
Alizarine Mordant 102
Black for Wool 168
Anilines for Hat Dyeing 96
Blankets, To Clean 31
Bleaching Straw 66
Feathers 77–79
Wool with Sulphur 33
Wool without Sulphur 108
Black Fast Aniline on Wool 72
on Silk 69, 70, 71, 106
absolutely Fast on Cotton for Hosiery and Knit Goods 105, 106
Bi-sulphate Soda for Acid Colors 161
(See later remarks at end.)
Cleaning by Dry Process 9, 19, 22, 25
Chemicals and their Use 145
Cleansing, Wet Process 8–26
Cleansing Goods for Dyeing 35
Color Mixing 38, 39, 45
Cleaning Hats 119
Curtains, Lace 121
Feathers 26
Furs, etc 19
Contrast of Colors 154
Dry Cleaning Cloths 16
Parasols 8
Velvet and Plush 22
Chenille Curtains 23
Upholstered Goods 25
Sheepskins 18
Furs, etc 19
Painted Goods 19
Dyewares and their Use 126
Dyeing Straw, all Colors 59–65
Felt and Fur Hats 89–96
Crape Veils 102
Velvet and Plush 76
Eight Colors in one Bath 74
Fast Wool Black 72
Fast Black on Silk 69, 70, 71, 106
Soap Colors on Cotton 66
(See end of book for other fast colors.)

PAGE
Dyeing Sweet Aniline Colors....39–43
with Alkali Blue.... 53
on Jute.... 58
on Flax.... 59
with Acid Colors.... 48
with Benzine.... 126
Enamel for Gloves.... 21
Feather Cleaning.... 26
Bleaching....77, 79
Dyeing....80, 82
Fire-proof Building.... 115
French Dry Cleaning....8–25
Finishing Compounds.... 109
Fast Colors on Cotton.... 66, 105, 106
Glove Dyeing.... 108
Hat Cleaning.... 119
Hard Water, To Soften.... 113
Harmony of Colors.... 155
How To Clean Dyed Hands.... 162
Iron Liquors.... 140–142
Irons for Pressing. (See end.)
Incombustible Wood.... 118
Jute Dyeing.... 58
Kettles for Dyeing. (See end—Mordants.)....43, 101, 126, 139, 144
Mordant for all Colors.... 107
Alizarine.... 102
Measures and Weights Compared....171, 182
Naphthylamine Black D.... 166
Neutral or Sweet Colors....54, 39
One Dip Aniline Black for Cotton.... 169
Vegetable Colors, and How to Make....66-69
Purification of Water.... 114
Paint, To Extract.... 110
Primary Colors.... 152
Redyeing Crape Veils.... 102
Spot-Remover.... 103
Straw Dyeing.... 59 65
Bleaching.... 66
Scouring....28, 31
Sheepskins.... 32–33, 71–72
Scouring Soap, To Make.... 120
To Level Colors.... 36
To Handle Goods.... 36
To Remove Spots....10, 34, 103
Velvet and Plush Dyeing.... 76
Water, To Test and Purify.... 114
Why Use Aniline Colors?.... 84
Wonders of Aniline Chemistry.... 122

THE

DRY CLEANER

AND

GARMENT DYER

PREFACE.

Since the publication of my Dyer's Hand-book, 1874, and American Practical Dyer's Companion, 1882, such advancements have been made in coal tar and its analagous colors that I have been requested a great number of times to write a small, handy work in the interest of the garment dyer, principally introducing all the new colors of real value to this branch of the trade, with the best means of using the same. Hitherto I could not find time to do so. Perhaps this is as well, as several new things are just now introduced of such importance that I force myself to give the trade full benefit without further delay.

At the same time the process of French dry cleaning has developed to such a state of almost perfection, that I propose to do what, as far as I know, has not been done up to this time, namely, in a plain, practical manner, reveal all the mystery of this fine art, together with the utensils needed, and the best place to purchase them.

I have also been asked for a book on feather cleaning and dyeing. This I propose to give attention to in this work, as also, many practical hints on cleaning in general. As my hand-book has been out of print for some years, the last copies having been bought up by the late Dr. Frank, of *Textile Colorist* fame, for his personal friends, at double publisher's price, and the American Practical Dyer's Companion being chiefly in the interest of the manufacturer, it has been concluded on all hands that such a work as the present will fill a long-felt need. It will be sold at a price within the reach of all.

The writer has drawn entirely upon his every-day practical experience in the cleaning department; and this, also, is so in nearly the whole of the dyeing and finishing departments. Other sources are acknowledged, which are the "new things out," of which the processes are copied for what they are worth. Discretion has, however, been taken to only allow what appeared to be of sterling value.

THE AUTHOR.

October, 1891.

Cleaning.—This phrase will be used in connection with goods that have soap or other articles brushed or sponged over them to remove dirt.

Scouring.—This is articles that get a soap-bath cleaning.

Dry Cleaning.—Goods that are cleaned in benzine or other volatile spirits.

Cleansing.—This is the freeing from dirt, etc., of all goods for dyeing.

In this work is published for the first time the methods to correctly make the one-dip colors, both in wood and anilines, with proper proportions.

Certainly, but for the pressure brought to bear upon me, I should not have forced myself to again commence the task of writing another book; but realizing the force of the axiom "that it is not theoretical but practical books the trade requires," the writer trusts that his efforts will meet the wishes of his friends and patrons, as that alone will render such an undertaking justifiable.

The wise man liveth for to learn,
Then scattereth knowledge in his turn;
Thus blessing as he goes along
The anxious and inquiring throng.

F. J. Bird.

CLEANING.

Many goods are better cleaned than scoured, as follows: Woolen rugs and table covers, velvet pile, Brussels and Wilton carpets, etc. After they have been thoroughly freed from dust (which, by the way, in Philadelphia, is called cleaning), to make them look clean and bright, spread out, on a clean place, and scrub over with a soap prepared as follows:—

Dissolve one pound oil soap in two gallons boiling water, and let cool. Then take part of this in a bowl, and, with a piece of hard oil soap and stiff scrubbing brush, go all over the goods, using a sponge or fine sprinkler to quite dampen the surface. If there are any spots, rub the hard soap on them, and scrub till bright; then, with a sponge, soak up as quickly as possible all of the soap scrubbings. Then take towels and rub up dry, washing the towels out continually in clean water; when as dry as can be rubbed, leave that part for another, until all is finished. For table covers, or articles that are small enough, hang up in airy place to dry, free from sun or heat, as either will cause the face to look dull. If too large to hang up, let them lie on the floor, with doors and windows open. Cloth garments, not too dirty, can be cleaned in the same way, as also straw and felt hats; but, as a rule, the dry cleaning is best for these. Experience alone will decide. Under any circumstances it is only safe colors that can be so treated, as no water must touch fugitive colors.

TO CLEAN PARASOLS,

in plain colors, that cannot be immersed in water, can be done by this process only: Before the rubbing up they are rinsed with cold water and a sponge, inside and out; then one teaspoonful acetic acid to one quart of water, pour all over the outside to fix the color and gloss the silk. Rub up dry, and hang it up open in the sun so it can dry quickly, and so prevent the wires rusting. Only those that will not dry clean, on account of too much dirt or worn marks, should be done this way. Much depends on doing this kind of work quickly for the success of it.

An expert can make many things look equal to new done in this way.

Many things, too dirty or stained for dry cleaning, can be treated successfully as follows. Have everything in readiness:—

First.—The board to scrub on, and brush with water and cold soap, and piece of soap.

Second.—Tub cold water for rinsing off.

Third.—Tub cold water, with salt in, for cotton or woolen goods, or if silk, or partly silk, acetic acid in place of salt.

One man can do all the details as here given by taking one piece at a time through the different processes as follows, but for this delicate work it is better to have help, as:—

The first, to wet the spot, soap it, then scrub it; then hand it to be washed through cold oil soap; then, through cold-water tub; then, into salt, or the acetic acid; to remain in the salt or acid a short time will not hurt, so that several pieces can follow one another till all reach the salt or acid; if small things, use a wringer; if large, a whizzer; then, if at all doubtful about running in drying, have sheets of cotton or linen; spread goods on, roll up tight,

shake out, and hang to dry; silk must not be rolled up, but, with soft cloths, rubbed up dry.

This cold cleaning is mostly suitable for single ripped or doubtful things, but the sheeting is good for poorly-dyed cotton and woolen made-up goods; they sometimes require two or three good sheetings, so that enough dampness is not left in to run.

FRENCH DRY CLEANING.

This is so called for the following reasons:—

First.—The French were the first to practise this method.

Second.—The materials used are mostly volatile.

Turpentine, rectified, and called camphene, was the chief spirit used at first. This had a very pungent odor, offensive to many, and it left kid gloves harsh. Other things were tried, and at last benzine was universally adopted as the chief factor. As I have had quite a large experience and been very successful in handling fine goods, as well as plain, I shall give full details and explain all secret processes not previously revealed.

The most elaborate dresses, costing $100 and upwards, I have cleaned by this method:—

First.—Look it over and see what stains or water marks it has. Does not matter how much dirt or grease, as this will easily remove; but you want to get a good idea of what the stains are composed of, so as to know how to remove them.

Many people look to this last, and cleanse first. I prefer the opposite, if the article is not very dirty, for the reason that, if cleaned first, the materials used to dissolve or scatter the stains will leave a mark around, which will be difficult to remove, and if the stains are taken out first the marks will in most cases wash out in process of cleaning.

Second.—Take the article to be cleaned, and, if plain, lay it on a clean board; if a made-up skirt, pass a clean ironing board through it. Then take one stain at a time. Egg or other substance that stands in lumps remove as much as can be with back of knife or thumb-nail so as not to fray or injure the fabric.

Then moisten slightly with cold water, touch with piece of hard, dry oil soap, slightly brush with nail brush until removed. Then with soft cloth dampened in cold water, wipe off till clean; then place dry, clean cloth under, and rub on the surface with soft, clean cloth till dry, taking care that all the outside parts of the spot is rubbed so dry that it cannot run or leave any mark around. If the spot is paint—say black or dark red—benzine will remove it in the same way, only no water must be used, and the spot must be washed in it every now and then to wash out the stain as fast as it is loosened. This is done by gathering up the spot and dipping it into the liquor, and so keep on until it is out. If light paint, alcohol is a better solvent than benzine. It is used in the same manner.

Some materials are so thin that you cannot work with them long enough to take it all out. In that case, you must fall back upon your bargain with the owner to take out dirt and grease, and as much of other things as will come out.

Ink stain.—All material that is white and will bear it may be treated as follows: Have a teacup nearly full of hot water, place the spot over, and a speck of oxalic acid on the spot, then lower enough for it to dissolve on the spot, when it disappears. In another teacup of warm water place the goods, to wash out the acid.

Four parts boiling water to one part muriatic acid can be used in place of oxalic, and if the material has cotton in it will not be liable to injury, as muriatic acid rots cotton less than any other acid.

Light cream and some other light shades will stand this treatment, but not any delicate tints of blue, green, pink, etc.

Sugar, ice cream and glutinous matter will not dissolve in any of the volatile spirits, but can be removed by the use of spot liquor, used as directed in place of water, or with water as per instructions on bottle, particulars of which will be found at end of book.

PITCH, TAR, OIL AND GREASE.

Benzine is the best solvent for all of these. Treat in the same way as for paint. If, however, it is hard to remove through long standing, then heat cotton-seed oil and pour on the spot to soften it; when soft wash and scrub and scrub and wash till it is out. This last process will not injure the color, but is more suited to dark work and thick goods.

WATER MARKS, LEMONADE, BEER, ETC.

In many cases when garments have gotten wet the color has been loosened or the water and dirt so united in the drying that run marks were formed, which in some cases can be taken out only by wet cleaning and sometimes not even then. If, however, the nature of the article is such that it must be dry cleaned, see that all dirt is well brushed out, as a good brushing will often take a lot of it out. Then proceed with cold water and dry oil soap, for green, pink, blue, etc., as explained for egg stain. If the colors are stronger and will stand a little spot liquor, so much the better.

Wine, fruit and other stains of this kind are very difficult to treat on delicate colors, as what will take the stains out will also remove the ground color of the material. And, moreover, it often happens if the stains can be taken out, that the acid or coloring

matter in the wine or fruit has changed the color So, as a rule, just steeping the spot in cold water and use towels with soap, then rubbing dry, is the best that can be done.

Wax.—Scrape off all you can, and let benzine, hard soap and brush do the rest. Rub dry.

Blood.—Soak in plenty of cold water. This will remove any amount.

Milk and Cream.—Water and spot liquor combined is the best. Proceed as for ice cream, etc.

Glue and Gum.—Steep in water only. Rub dry.

Now, after any or all of the above processes have been gone through, let the article dry as quickly as possible. When dry, if a plain article, lay it upon a flat board, which shall be 7 feet long, 14 or 15 inches wide, 1 inch thick. This board, finished quite smooth, if made of birch or hard poplar, free from knots, need not be covered with zinc; if of soft wood, it requires covering because of the amount of benzine it absorbs. This board should be placed over a zinc-lined, wooden trough 6 feet long, 30 inches wide, 24 inches deep, raised on four pieces, two at each end. Pieces, say, 4 inches wide, 1 inch thick, 36 inches long, screwed on each end corner flush to the front, lifting the trough 6 inches from the ground. This enables a bowl to go under one end, which should be 2 inches lower than the other, having an inch hole through the trough from its inside, so that all liquor that falls into it can pass through the hole and drop into the bowl. All liquors so caught is saved in a zinc kettle with lid, and when settled down will be poured off for use as afterwards explained. The four pieces or legs will then stand 6 inches above the trough, across which a 3-inch piece, 1 inch thick, is screwed; this piece 1 inch from the top. On these end pieces the long board rests, making it level with the top of the legs; this forms a table which can be raised or lowered to suit the height of the worker. The ends can be

filled up on the inside to level of legs, and the back filled up 6 inches above the top of table, so that the splashing from scrubbing will be caught by it and drip down into the trough. On top of this piece, at back, a 6-inch shelf can be fixed to hold scrubbing brushes, soap, etc. This necessary digression brings us to the board upon which plain things (by which is meant articles that will lie flat) are placed for scrubbing. Skirts have a board the shape of an ironing board passed through them and placed in the same way on the end pieces. Now get a large bowl of benzine, which place on right hand of table, and a good stiff scrubbing brush. Dip brush in benzine and dampen over about 12 inches square, then rub softly a piece of dry cleaning soap, if you have it, if not, white, dry Castile will do, but no other; then scrub, always taking care to brush the strongest way of the material, as some things, especially Surah silk, satin, chenille curtains, etc., have three times as many threads one way as they have the other, and would easily part or fray. When that square is brushed, take another, until the whole piece is soaped and brushed. This operation requires to be done as quickly as possible on thin goods, or one part will get dry before you have got through, and if the scrubbings get dried in it is almost impossible to get them out again, as it forms a kind of glue or varnish that sticks as a fast stain. When the scrubbing is finished the article is put into a kettle made of zinc, any suitable size, say, 2 feet long, 18 inches deep, 15 inches broad, is better than round and stronger. This kettle half fill with benzine before starting to scrub. Well agitate the article in this and turn over and over several times to wash out the scrubbings. A punch, or dolly, as it is called in the old country, is good for lifting and striking down on the goods, as this knocks all of the scrubbings out. For description of punch, see end of book.

A washing machine is used by some, but it is not any better and is more expensive. A zinc kettle is preferable to any other, because zinc does not absorb any liquor or require so much cleaning, and is always sweet and clean, with no mechanism to get out of order. The article is allowed to drip only a short time; if it drips too long it is liable to dry, and that dry place shows a stain. Then place it carefully in the centrifugal machine to dry; a few turns is all that is required. Have ready prepared a blanket for dark goods, and a white sheet on top for light goods, laid on table to spread the goods on as they come from the machine.

At this point it is carefully examined, and, if a spot or anything appears, it can be dampened with benzine, touched with soap, brushed and then rubbed with cloth just as quickly as possible. The whole article is gone over with a soft white cloth for light goods, and soft sateen cloths of dark color will be best for dark articles, as no lint comes off this material.

Now the article is ready to put up to dry in an airy place or in gentle stove heat, but not in hot sun, as too much heat fixes the scent in, and is liable to make it run on pleats or double parts of goods; open or plain goods will not hurt.

Examine goods when dry, before finishing, and, if any spots are there, remove them by one or other of the spot removers mentioned. Often spots from feeding show up. Take each spot on the tip of finger, dampen with water, scrub with nail brush and wipe off; this generally does it quite easily.

Fronts of dresses sometimes show quite a number of stains after dry cleaning. If they are very numerous and near each other it is best to treat one at a time with cold water and soap only, allowing the water mark to spread from one spot to the other, so that at last only one large water mark is left; this get dry cloth under and rub with dry cloth on

top, scattering the water mark all around its rim till it gets so thin in dampness at its margins, that no mark will be seen.

Have had to do it sometimes out to its seams and up to band and down to bottom. And when rubbed up no one would know it had been wet cleaned.

PRESSING OR FINISHING.

After Dry Cleaning.—If handled properly, very little is needed, as a smoothing iron is held in the hand (not too hot) so that only enough weight rests on the thin goods to smooth them without making an iron mark. If the article is creased or has plate marks or tumbled places in, then dampen a soft cloth, not a sponge, as the cloth will dampen the goods more evenly, and rub the parts just enough to smooth the goods, but not to wet them. Particular care must be taken never to wet goods after dry cleaning, or the new appearance of dry-cleaned goods will depart. These remarks do not apply to cloth or thick goods, as they are finished by using a damper spread on before the iron goes on, then while steaming, brush smooth. Made-up clothes are done the same way.

Made-up Clothes—When not too soiled are far better in every respect dry cleaned, as they look, feel and press up better. They do not get drawn out of place like scouring process and takes less time. So, all things considered, it is not more expensive to dry clean than to scour, and has the following advantages :—

First.—The color will not be changed or the fades intensified.

Second.—One part will not shrink from the other.

Third.—Articles can be done at a few hours' notice, if required.

Fourth.—They are free from odor if the following rules are observed :—

First.—For goods required quickly, use only clean benzine; either for scrubbing, punching, or washing.

Second.—Use only dry cleaning soap, as this does not leave the peculiar scent that Castile soap does.

Third.—Spread out the goods as much as possible in an airy place.

Silk, sateen and all thin goods can be so finished. Some people prefer to cylinder them up. My objection to this is: For cylindering, they require dipping in water to get them to adhere to the cylinder, and in some delicate colors and figured goods of different colors this is running too much risk, especially on silks, most of which are dyed in a soap bath, and finished up with the following soluble ingredients: glue, gum, glycerine, sugar, etc. So, if the color did not run, any or all of the finishings in it may.

Velvets and plush goods, after dry cleaning, can be finished as explained elsewhere, but is best finished on steam tables, or, if there are no steam table, dampen the back with sponge and lay it on the cylinder and brush up the pile while it steams. This, of course, refers to plain, unlined pieces. Waists, coats, etc., that are lined, should go on the steam table for the large parts, and on copper steam arms for sleeves, etc.

CLOTHES-CLEANING REMARKS, ESPECIALLY REFERRING TO DRY CLEANING.

First.—Look well to dirt and mud, and see that all is brushed out.

Second.—See that all dust is well beaten or shaken out, for benzine takes grease out far better than it does dirt and dust, and if goods are brought to be cleaned, when finished, they ought to be free from all dirt, dust, grease, etc. Ladies' dark dresses and

gentlemen's overcoats, especially, require beating. A good, stout flexible cane is best for this purpose.

Third.—Let no spots escape notice, as before they are commenced to be scrubbed, every spot should have a soap mark on it. If dirt, pitch, tar or grease, benzine and soap ought to take it out by scrubbing. Sometimes, however, scrubbing does not; then it must be dipped in benzine and rubbed with the hands; if not out then, wash, rub, and dip in alcohol, sulphuric ether, or turpentine; but, in the latter, the scent is objectionable. If the article has much tar or pitch on, soak it with any sweet oil, or lard for a day or two, to soften it; and, if very much and very hard, then dip it alternately in hot oil and warm benzine, sousing the spot each dip. If spots of starch, sugar, paste, or any glutinous matter are there, spot liquor is the thing, used as per printed instructions.

It should be an article in the dry-cleaner's religion to faithfully remove all spots, as a failure to remove them brings dry cleaning into disrepute. More than half of my customers say that dry cleaning done at other places is nothing more than the spots brushed over enough to hide them, which reappear in a few days, and causes many to think dry cleaning is no good. Now, when all spots are removed, lay the article on the table over the trough and wet it with benzine, soap and scrub all of the soiled places, not leaving it till it looks bright and clean. Use plenty of benzine on it, as it is not lost, for the trough catches it, through which it passes into a bowl, and thence emptied into a wash boiler to settle. After settlement, the clean is used for next scrubbing of goods not white or very light. All light goods must have only perfectly clean liquor, both for scrubbing and punching.

When all the cloth is scrubbed clean, then look to the linings, and do them in the same way. They will come clean and bright if the scrubbing is not

at fault. Dry cleaning, for certain, means plenty of elbow and wrist labor. Many fail through not knowing that soap can and must be used to make a good job.

The goods are now washed or punched, if light goods, in clean liquor; if dark, in what has been used before. The same liquor will do from two to four times, according to the color and condition of the goods.

Dirty goods will do in used liquor first, and after draining, punch through clean to finish. Then whizz and rub up as already described.

When dry they want looking over again, and if any spots show use spot liquor and rub up dry.

All the light linings must be rubbed over with soft white cloth and the dark with a dark cloth, so it does not get the lint of the white cloth rubbed into the dark goods, as this is hard to brush out.

Sometimes, after pressing, on drab and other colors places show dirty looking. This is caused by not being thoroughly scrubbed or not having been properly rubbed up. Especially this appears on sides of pants, elbows of coats, etc. This can often be remedied without recleaning by rubbing crumbs of bread several days old on the spot, or a rubber tablet is good. Fret the place with the sand part and then rub the sand dust off with the rubber part.

For white or gray goods get a piece of French chalk (not powder) and rub till clean, then rub the marks of this off with crumbs of bread or a soft clean cloth.

CLEANING SHEEP-SKIN RUGS, ETC.

If not very dirty they will dry clean by pouring the benzine into them, well soaping, and rubbing the open hand over them. When dry, if the white looks dingy, rub flour well into it and when nice

looking beat all of the flour out and comb it smooth.

The back will be soft from dry cleaning; if dirty, should be scrubbed before the face is commenced.

If too dirty for dry cleaning, you will find the process of scouring them under the heading "wet cleaning."

Druggets, etc., can be cleaned in the same manner, only leave out the flour.

CLEANING FURS, SKINS, WINGS, ETC.

White Furs are cleaned same as white rugs.

Dark-colored Furs are rubbed with bran after they are dry from the benzine and soap.

Black Furs and Skins, or very dark ones, generally do without the bran.

Wings come quite clean, even white ones, scrubbed on a tray with benzine and soap, and then washed and rubbed dry.

The object of putting them through the benzine is, if they are very dirty, it will save a lot of time, as it will take most of the dirt out and help to raise the fur that has been matted and laid down. The bran will finish the raising and soften and gloss the fur. A very fine comb and stiff brush will complete it.

FANCY SILK PAINTED GOODS, ETC.

Fans, etc.—Are cleaned as described, with benzine and soap. These must be very carefully scrubbed so as not to brush the paint or feathers too much. Only oil-colored goods are safe to handle, and they must be done quickly.

Water Colors.—Don't touch them, as some of the aniline colors are simply dissolved in alcohol or benzine and quickly dried, and just as soon as any liquor touches them they will go.

If not sure about oil or water colors just take them in at owner's risk; if a success, to be paid for, if not no charge. This is a good rule to adopt for all doubtful or worn goods.

Leather Goods, embossed or not, will clean in benzine with soap; rub dry.

KID GLOVES

Are done in the same way as leather, care being taken to well rub up every part. Some clean them on wooden hands, but these are expensive and not necessary, except to show a glove in the window. Others clean them on a tray, but rub them up after squeezing the benzine out, on turned sticks about 12 inches long, running to a point at one end and a diameter of 1½ inches at the other. The big end rests against the chest and the finger on a clean cloth placed on a table. This is a very good plan, but takes longer about than laying them on the table to rub. After they are rubbed, not only on the flat, but also the sides by turning them that way, then, if not too long, draw in a long breath of wind and blow it in at one puff. This will fill them out as full as though cleaned on a hand.

Buckskin and Doeskin Gloves can be done in the same way if not too dirty. If very dirty they have to be washed in soap bath and whiting for white, and other earthy dry colors to match dark ones. They are dried up from this without a wash.

The object of the earthy matter in the soap are two fold: first, it gives a fullness; second, it covers stains. Of course only enough is used to color the soap liquor. Before they are quite dry they require to be stretched into shape. And when not quite hard dry put them on the hands and rub them soft.

Leather Breeches are done in the same way as buckskin gloves. They are better dried in the air than by heat.

STAINS IN GLOVES.

Ladies handle candies, fruits and so many other things, that, after having done your best to remove, part of the stains will show. Oxalic acid, muriatic acid, salts sorrel, etc., will remove bad stains, but they all harden the kid.

ENAMEL FOR GLOVES.

After cleaning gloves are always a lighter shade. If the owner will pay the extra expense they can be re-enamelled, as follows :—

White.—French chalk, finely powdered, rubbed on with chamois leather, then small piece of hard, smooth, dry cleaning soap to polish.

Drab.—Yellow ochre with Prussian blue in very small proportion, mixed with French chalk, then soap as for white.

Yellow.—Ochre with chalk and soap over.

Gray.—Blue with chalk to match.

Brown.—Burnt umber and chalk.

For any other color get dry materials to mix with the chalk. Painters keep such in a dry state before oil is added to it.

Beeswax may be used in place of soap on dark colors, after the wax has been used, by rubbing, up to a polish.

Of course, all of the above have to be used very sparingly or it will rub off. Properly done, the gloves will not soil so soon as those not so done, and certainly look better, for which an extra charge can be made of at least five cents per pair for small and ten cents for larger.

Buck and doeskin gloves, etc., if not too much soiled will do dry cleaned. If much soiled they are cleaned in cold oil soap, with just a little whitening in it, for white gloves. For colored ones, use the

colors in the soap to match the gloves (as described before).

These kind of gloves should be placed on the hands of the person cleaning; or, at least, after they are cleaned, to press all the soap out and keep in shape, then hang to dry in air, not sun. They must not be rinsed after washing, and before quite dry must again be put on hands to stretch into good shape.

FELT HATS.

Any color will clean as described, with benzine and soap. Well scrubbed, washed off and rubbed up.

SILK HATS.

Brush all dust out first; see that the nap is all one way, then use soft sponge well dampened with benzine. If very dirty, wet and sponge evenly over until clean. Then rub with dark soft cloth till almost dry, then finish with soft silk cloth, soft plush or cotton wool till quite dry. Fresh benzine must be used for every one, as dirty benzine will make the nap sticky.

VELVET CURTAINS.

The board on trough was made 6 feet 6 inches long so that curtains could open out on it. The previous process is adopted, only using care to handle carefully. Every part will not be soiled alike, therefore, some parts will not require as much work as others. After they are finished and rubbed up with clean hard brush, set the pile all one way, then hang straight to dry.

If lined, that should be cleaned also. The lining may require smoothing lightly, but not the velvet.

If, however, the pile is crushed in places, such places will require to be raised on steam table; failing that, place a damp cloth on top of hot iron, and hold the places over, and brush pile up as its steams.

PLUSH CURTAINS, ETC.

They are done in the same way as velvet, but often require finishing.

This is done by putting a cloth on the face, wrung out of water as tight as can be, then, with even pressure, pass hot iron on top, and while steaming brush up the pile, and so continue until the whole is done.

Much experience is needed to make them look like new, but I have seen them so appear. If lined, the pile is laid together long ways, so as not to tumble it, then the back is pressed lightly, dry. That is, no damper is used.

The above finishing is given for those who have not the steam table, which is much preferred.

CHENILLE CURTAINS.

These are done in the same way as velvet, care being taken to brush pile right away. If marks from hanging by hooks, etc., are in them, a cloth must be used that is damp and iron on top and brush up as the plush. It is better to do it two or three times lightly than too heavy at once, to crush the pile, or it would look different to the other parts.

SILK AND SATIN CURTAINS

Often have fly marks on them; as benzine will not remove them, spot liquor must.

This is done first, and a folded cloth put under to absorb any dampness, a dry place being used for every spot.

Make just damp enough to remove it and rub dry at once, then dry the curtain before dry-cleaning it.

VELVET AND PLUSH PIECES.

After cleaning and dry, finish with damp cloth on face. Iron velvet very lightly, then brush at once, turn over and iron on backs without damper. Only stout velvet will bear this; this must be raised on a steamer which is made shallow, say 4 in. deep, 2 ft. long, 1 ft. wide, with perforated top, on the oval and quite smooth. Steam can be let in, or water can be kept boiling under it, and velvet drawn over. It requires two persons, one to draw while the other holds, then it is ironed on the back till smooth. If it is large pieces and much crushed the third person should hard brush it as it is drawn and steamed.

The steamer here mentioned can be made of tin or copper, to stand on a stove for those who have not steam. See cut at end of book.

It is considered that sufficient examples have now been given for clothes and draperies to suggest to any ordinary person the best way to proceed with other articles. With the methods given the writer has cleaned from the plainest up to the finest work, including a French imported bonnet made on gauze frame, with velvet, lace, flowers and feathers, no part being taken off. Parasols cannot be considered clothing, but they have their place for use and ornament. For dry cleaning they are held with one hand on the table, and with the other well scrubbed with benzine and soap, one section at a time, going over the central part, where the creases and dirt always exist, two or three times. If any section first done looks like drying up, throw clean benzine on,

as it must be kept wet till it is scrubbed all over. Then wash benzine over it, rub up and dry open. It will be quite smooth and, only need to have the trimmings lightly pressed.

UPHOLSTERED FURNITURE, SCREENS, ETC.

This class of work gives good results, though very few attempt it.

Saturate with benzine, rub on soap, scrub, and repeat till clean. Always commence at top and work down. Let one cloth follow another till dry. Labor is the chief expense.

One man can do a large suit in one day, for which $10 to $12 is charged.

Few garment cleaners would think of taking in oil paintings to clean. This class of work will pay well and look well. Get a dirty one and cut a potato in half, and after wiping all dust off the painting, rub the juice of the potato on one-half till clean, then with a damp, clean cloth wipe it dry, and the dirty half will show up the clean.

There is no danger of the process injuring the oil or color or varnish, and $5 can be earned in a few minutes on a good picture.

Before leaving the dry-cleaning department will say that in washing or punching goods after scrubbing, give plenty of benzine to wash in, and open goods out several times so that all of the dirty parts can have a good chance to get clean.

About five gallons is required to punch one suit of clothes in. Of course, the light colors are done first, then the darker, then the darkest. One lot, with addition, will serve for about three suits, it is then put aside or emptied into another vessel to settle for a day or so, when, without shaking up, it is poured off as long as clean, and the balance cast into the drain, taking care to let water run down the

drain so that the dirty stuff shall not stop there and be offensive.

I have tried to make it all plain, but if not, anyone buying this book and sending stamped directed envelope with any question, shall get a reply; and anyone wishing to see my plant can do so by paying $1 the time of showing it. Any who wish to come here and receive practical lessons on their own or on our goods can do so at reasonable rates per lesson. Or we can send some one to teach parties who desire it at their own place.

FEATHER CLEANING.

If very little soiled dry cleaning may do, but they require mostly the following treatment:—

Wash in warm bath of oil soap; have a piece of soft flannel, upon which pass some soap, and apply to all extra dirty places, holding the feathers in one hand, and washing down only, so as not to break them. Now prepare a bowl of warm water to wash the soap out, throw them in to soak while you get another bowl of warm water, containing just enough sulphuric acid to taste a little sharp; now wash all of the soap out in the warm water, and lift and open out into the acid water, and let them lie in for a short time to bleach the sunburn and wear marks out. For this, some use oxalic acid; others, salts of tartar.

While they lie in the acid get a bowl, into which place a tablespoonful of dry starch and half pint cold water, dissolve, then draw the feathers one at a time through the starch, as open as possible, so that it will get into all the parts alike. Then draw through the fingers to press the starch liquor out, draw through a clean cloth once or twice, then, holding the stems in one hand, strike the other parts over the back of the other hand to part them out. Hang up by a string to dry in a place where the wind will blow through them. If not much wind, agitate or

shake them before they get hard dry. While drying get some water in a tea kettle; one made of tin is the best, with the spout up higher than usual, so that when it boils it will give off steam from the spout instead of the top. The top must fit tight to prevent steam from escaping there. The water in the kettle must never be quite up to spout, or no steam will pass through the spout. If a person has convenience a little steam jet will do, like a gas arrangement that can be turned on or off. The feathers are held by the end of stem and tip, and the back passed up and down over the steam several times. This will blow the fronds out, and open it to its fullest extent. Then lay them straight on a table, and comb them out. As they are combed, one at a time, they can be laid straight in a pile of a dozen or so till dry, when they will be curled to desirable shape, and wire the stem.

Light-colored feathers are done in the same way.

If any light colors are faded, a little aniline can be dissolved in boiling water and added to the cold starch. The color must be used very sparingly or they will get too dark, and they must be kept well agitated all of the time they are kept in the starch, so the color will take evenly. In this case, enough starch and water is made to give them plenty of room. The acid left in the feathers (they must not be washed from the acid before going into the starch) is generally enough to enable them to take up the color. If it is found otherwise, add a drop to the bath. This process may be termed "tinting." It is only light shades that do well in a cold bath, but these will wear as well as when done in a hot bath, and is less trouble.

The curling is no use to try to explain, as this is an art, and has to be learned. Feather bleaching see article on "bleaching."

Feather dyeing will be treated on in dyeing department.

For further particulars see the Practical Feather Cleaner and Dyer, which is devoted entirely to the subject, with fifty dyed samples, by Alexander Paul. See advertisement at end.

SCOURING.

Goods that are too dirty or stained for wet or dry cleaning must be treated as follows:—

Sort out, and if some are likely to be of fugitive or poor-set colors get all of the following ready beforehand:—

First.—A cold oil soap water to wash or punch them in.

Second.—A cold water to rinse in. In some cases two cold waters.

Third.—Another cold water with one table spoonful of salt to the gallon. Salt is the only chemical that will dissolve equally well in cold or hot water. If it is cotton or linen goods with yellow or green in, add one teaspoonful of alum to the salt for every gallon. The alum must be dissolved in boiling water.

Fourth.—Clean sheets must be spread on a table.

All things being ready, everything for success depends on quick work. If any very dirty places are seen, give them a cold soap and brush, wash through the soap, wring, wash in cold water, in this open out and see if it is clean, if not, rub soap on and rub out in the same cold water, wring, then put into the salt, open out in this so the salt can get to and set all parts, wring as dry as can be and fold in the sheets. Wring up in these and while wrung up strike with hand all up the sheet, this will make the article nearly dry. Then shake out and hang up open so they may finish drying quickly.

Silk and thread curtains that have had water marks and other things on that dry cleaning would

not remove have been done this way with much satisfaction. Badly-stained ladies' wraps, dresses that are taken from the waist band, or not bunched up in thick parts, children's clothes, gents' thin summer coats, etc., etc., brought in for dry cleaning, have at times to be done by this scouring process for your own credit. Some thin goods have a little stiffening in them when new, to give them body. In such cases, thread goods, get a little starch in just enough of the salt water to open it out in before the sheeting.

If thin silk goods, they need not go in the salt, but in an acetic acid cold bath. A little of this may be used with the starch. One teaspoonful of acid is about the proportion to a gallon of water. A more expensive stiffening can be used with better effect for thread goods, viz.: Gum arabic or dextrine, dissolved for the purpose.

For silk, equal parts gum, glycerine and loaf or pure white granulated sugar. This is used in new goods, and does not rattle, is not harsh, and gives body. After silks are washed they lose this and become flimsy. This dressing will suit any color, and the acetic acid in it prevents the silk from mildew and gives gloss. Never wash after it, or it will wash out, but go straight to the cylinder with it for finishing.

Thick clothes are done in the same way, only, warm waters may be used, but not hot, or they will shrink.

Oil soap stock keeps up a surprising lather for all cleaning purposes.

Thin woolen goods, alpacas, lustres, etc., are better to have just a trifle of stiffening at the finish, as it gives back the fullness it had before. Thick things, of course, do not require it. After they are finished, before hanging up to dry, give a good shake and pull well into shape. They will press up much better. Some things have cotton in and are

liable to run in color; light pants sometimes have black linings in the fly, and coats and vests have black pockets (shame on the tailor!) in such cases, after they are well whizzed it is safe to sheet them, but in no case use alum to such, as some do, thinking to fix it; salt will do that better. Alum, the reverse, because of the nature of the acid it contains, which affects cotton, but not wool. Yet, it is not good for cleaned woolen goods, as it makes them harsh and whitish looking.

Faded grays, etc., are improved by having a little soluble blue or opal blue, dissolved, and added very sparingly with one drop of sulphuric acid, or, better still, three drops of acetic acid in the salt bath. Of course, they must be well opened out, so it can take evenly; by this means a fresher look is imparted.

BLACK GOODS SCOURING.

I have found from experience that black shawls and open goods are best, when too dirty for dry cleaning, to be taken up out of the soap after all spots, etc., have been taken out with barely warm soap scrubbing and without rinsing; dried openly, as the washing after soap decomposes it, causing the whole surface to assume a white mottled appearance. Whereas, if dried directly from the soap that does not occur, and the goods receive a fullness from the soap which is very desirable. Care must however be taken not to get up out of dirty soap. If the first is too much soiled give it another soaping.

Made-up goods, of course, cannot be so treated. If cloth with a nap or pile is so cleaned, brush the pile down before drying.

White open goods do well the same way, but made-up goods are liable to run in the thick parts unless they are washed in warm water from the soap.

Colored goods after soap and warm water wash should always go into salt water.

CHENILLE CURTAINS, ETC.

These sometimes have to be scoured when gone too far for dry cleaning. Proceed with them as for fugitive colors and before drying brush the pile the right way on both sides and dry in air; the sun will make them run. After they are dry just fold them up quite square and tie the ends; this keeps them from getting tumbled. When dry, if the pile looks crushed, they must be steamed and brushed up as described for plush curtains.

BLANKETS SCOURED.

Colored ones, but not often white ones, will do dry cleaned. If too dirty for that, then treat them same as black goods on previous page, and if the wind is good to dry them quickly (such weather should be chosen, if possible) they need not be washed from the soap, but must be whizzed as dry as possible. If they have to be dressed lay them as soon as taken from the whizzer, selvage to selvage on a clean table, find the way of pile and brush it quite flat so that it lays down like new, then turn over and do other side the same. Some have pile on both sides, and if owner wishes dress them both sides. The charge is 25 cents for cleaning single blanket, 25 cents for dressing one side, 50 cents for dressing both sides; so that a single blanket cleaned and dressed, both sides, costs 75 cents, which pays very well. A good brush made from broom stock is good for setting the pile, but a carding handle will set it finer. This is wire set into leather, on back of which is a wooden

back, to which a leather strap can be placed to put the hand through. If there is any indication of the stripes running into the white, it is best to wash from the soap and give a slight souse in cold water before wringing.

Poles strong enough not to sway in the middle are used to dry on. If there is no pole a strong galvanized wire is the next best thing; some say copper wire, but it sways too soon and oxidizes. Let care be taken to hang up perfectly straight and level, as they look badly out of square. Lift, not drag, over pole, or the pile will be all roughed up again. The punch, as already spoken of, is the most useful thing for all this class of work. Wipe down poles and lines with damp cloth before putting up light goods. Many forget this and have to go over it again.

In hanging up wet, cleaned or scoured goods do not use the wire coat-holder, as goods look badly iron molded. Nothing is better than a clean part of a wooden hoop. The wire holders are all right for dry goods.

SHEEP SKINS SCOURED.

Cold soap lather, or, at best, slightly warm, is all that must be used. Before commencing, see if it is in good preservation, as they sometimes get rotten from being on damp places; if they are inclined to crumble have nothing to do with them. If only ripped, sew up the rips; if broken, put a piece of linen on the part; if good, but thin, make a flour paste and when cold sponge over and fold together, then sew around; this prevents them parting.

After the job is finished, take the stitches out, open, pull square and dry.

The soap liquor is poured on one part at a time, and if very dirty rub oil soap over it.

Now with the hands keep working it until clean and so on till the whole is done, then turn up sides and ends and work at those.

With the hands or sides of scrubbing brush draw all the soap off, and if clean wash in water a little warm. Repeat till clean.

Now whizz it as dry as possible. If it is now clean, but does not look a clean white (as white gets tanned with wear) then it should be sulphured as follows: An air-tight place is put up, say 6 ft. by 12 ft. according to demand and from 6 ft. to 9 ft. high, with sticks across, near the top, to place the damp rug on, or lines to place other white woolen goods open upon.

Place an iron pan on floor in centre, with from one to two lbs. roll brimstone in it. Put a red-hot poker in the brimstone to burn it.

Hermetically close the door so that no air gets in and no vapor gets out.

The fumes will play upon the goods all night, and when opened in the morning you will find them bleached white.

Now this rug is treated on the back the same as those that did not require bleaching. That is to say, if the back is hard, dissolve two parts alum and one part salt together and rub this in, and if when dry it is still hard, repeat it until it is soft.

To rub it with pumice stone or draw the back over the edge of a board will help it.

The following is also good: Two parts of alum and one part salt are dissolved and a little flour and whitening added, and rubbed in; then place the wool part on trestle steps to dry. The air is better than sun or heat for this. When the back is dry, turn over or hang up to dry the wool, and if the back is not soft enough, pumice stone it, and if not soft then, go over the back again with the above liquor. Finish by combing up.

SPOTS FROM NEW GOODS.

Often on the first time wearing, the misfortune occurs that goods get dirt on them in some particular place.

First.—To remove this, put a cloth, several times double, under and use cold water and hard soap, with nail brush It should be done on the end of a sleeve board or on end of finger so the wet is confined to as small a portion as possible, and make it no wetter than required. The cloth under will catch the dirt that goes through. Rub upper part dry, so it does not run. If any mark is left after, use crumb of bread.

Second.—Crumb of bread alone will sometimes take it out. Cut the top or bottom of loaf off, one inch thick. Cut this again into four to eight pieces. Hold the crust part and rub with the crumb part, using one piece after another till clean. I once did so to a drab coat and with one loaf of bread cleaned it all over; but there were no stains on it, or grease, only dirt.

Third.—Bran can be used for it by well rubbing on, but it makes more or less mess.

Fourth.—Ink eraser tablet will often do it very well, by using the sand side first and the rubber after.

Fifth.—Where the four foregoing fail because of its being fixed too firmly, add a little spot liquor as per directions to No. 1.

Sixth.—If on silk of delicate tint, use sulphuric ether, in small quantities, with directness to the spot and wipe off with damp cloth. If it leaves a mark get a bowl of boiling water and hold it over. The steam often removes it. If it still shows, then use one of the dry formulas from two to four.

Seventh.—In place of water, benzine or alcohol can be used, but as these scatter so—it is not so desirable. I have remedied this, in a measure, by placing small

crumb of bread outside of the spot, which absorbed it so it did not spread so much.

Before quitting the cleaning and scouring department, I want to say, that some black clothes after they are cleaned show faded on shoulders, etc., others are whitish and bare on the edges and buttonholes so that it does not look good to pass.

To remedy this, boil one pound chip logwood in one gallon water till reduced to one-half gallon, then add one-half ounce bluestone. It will now be very dark brown, drop in powdered sal soda or ammonia till it turns black on stirring, then add about one-half ounce dissolved dextrine or one five-cent bottle of mucilage, this will keep it from rubbing off. Put in stone jar for use, as it will keep a long time. There is no copperas in it, and it is this that turns logwood brown. In bad spots discharged by urine, etc., warm it and drop on concentrated. For the fades, add one part to four parts boiling water. It can then be reduced still farther for the remainder of the garment to prevent one part looking different to the other. Cotton specks and a lot of imperfections can be cured this way. In pressing up with damp cloths it will come off some, but when pressed looks well and wears well. I know it takes time, but would rather lose time and please a customer than have him dissatisfied and tell his friends what a poor hand I was. If not revived as here shown, many think it actually was made that way by the process used, as they do not notice imperfections so much before cleaning as they do after.

DYEING DEPARTMENT—CLEANSING OF GOODS.

All goods require more or less cleaning before dyeing. Even white goods that may not appear dirty are safe to be cleaned, especially if they are a bleached white, as the bleach is often sulphur, and

if not destroyed with a soap bath prevents the color being as good as it otherwise would be.

A warm soap liquor, with just enough soda to soften it, is all that is required. Work them through this for a short time, then wash out in two warm waters, and let lie in a sour bath, made with warm water and just enough sulphuric acid to taste a trifle tart. Let lie in this as open as possible for one quarter hour. This will clean and brighten them for the dye. If very dirty or spotted lay them on a board and scrub all out before they get to the soap bath.

I object to hot soap and soda baths for cleansing, as it not only injures the goods in making them tender, but fills them full of creases, so that they never look well again. The only case where it is allowable is when an article is much faded in one part and not in another, and it is desirable to try and draw off as much of the old color as possible.

Nicholson's or alkali blues are liable to go this way; in this case give them plenty of room so they will not crease too much. If the faded blue is for any other color, as dark green or seal brown, it is better not to put it in a sour bath, as that would bring up the color again.

TO LEVEL COLORS BEFORE DYEING, AND HOW TO HANDLE GOODS.

The acid bath referred to will do this to some extent, but if much faded boil in a bath of from one to two ounces of tartar and one ounce sulphuric acid for one third hour; this is good for light colors.

Dark colors can have one ounce blue stone and two ounces sulphuric acid, or one chrome and two of acid. This quantity is intended for one dress. Gents' clothes do not get this, as they are dyed dark enough to mostly cover in brown or navy, and if much faded only dye them black. Through every operation the goods pass see that they are properly

handled; that is, kept in an open floating condition. Do not have too much in one bath to crease up, and when lifted out of dye bath put goods into cold water quite open, and out of this spread openly on rail or horse.

I wish to impress this most effectually, as many lift the goods from boiling baths on a stick, and so put it on a rail or peg all in folds; this will produce creases that will be so fixed with the heat that it will be like a crack in a board—bound to show. If it appears to come out in the finishing it will show again in time, and men's clothes never will press good if so served. Goods for brown, navy and black require cleansing just the same as for light colors, only they do not get soured. Some boil them in soda and think it all right. The mistake is, many fall into a rut of doing things from seeing others do it, never for a moment asking themselves, "Is this the best way?" If they considered a moment they would see that the boiling in is not only a waste of time, but is an absolute injury to the goods, as only the surface is softened; the dirt and grease is still in the texture of men's thick clothes. This is easily proven, and to do so, when dry, take the parts that were very dirty and rub them up a bit; the dirt will come to the surface.

Moreover, so much is generally stuffed into this boiling soda that it gets so creased up, that in thin tweed and cloth made-up goods it is quite impossible to get the creases pressed out, and coats get all out of shape by such usage. Goods get enough creased in the proper manner of dyeing without such cruel treatment.

Silks and satin goods, except very soft, should not be rubbed and then very softly for two reasons: 1st, they are liable to fray; 2d, they get too full of creases. If thick silk or satin gets badly creased its appearance is forever marred. The proper way is to lay them on a table and scrub all the bad parts, then

give them a soak for a time in good soap or soap and soda, as the case may be; then every now and then open out all through and let lay a time longer, then wash off in two warm waters. The soap liquor being good can be used afterwards for woolen goods.

COLOR MIXING.

By this is meant taking the primary colors and from them producing the shades required. It has never been questioned but that the writer was the first to get all the colors and shades required from anilines. In two distinct classes, viz.: Neutral anilines from sweet or neutral colors, for cotton and cotton-mixed goods, straw, etc.; and acid anilines of the primary colors for all colors and shades to dye in an acid bath, fast and bright without previous mordanting. I spent the best part of three years in laboratory experiments, and published the results in the various textile publications at the time. I also made pattern books—No. 1, of all the cotton goods; No. 2, cotton and wool mixed; No. 3, wool; No. 4, straw; No. 5, leather, etc.

From four colors I got about five thousand shades, all useful for one purpose or another. These achievements were copied and circulated all over the world. This brought me so many inquiries that I had to start in and make the compound colors for sale, as in most cases they preferred to have it made to hand than to follow instructions how to make it. The manufacturers of new goods were benefited most by the inventions, as they were able to discard the use of other drugs and chemicals and dye all wool, worsted, silk, shoddy, etc., in one bath, and by running cotton and wool mixed goods through Bird's Patent Aniline Mordant for about one-fourth hour the cotton and wool could be dyed in one bath without washing off or using tin liquor. This

thoroughly revolutionized the practice of dyeing in the large mills of the East.

From then till now very little of cotton, or cotton and mixed goods, are taken in by the garment dyer, as the old way was too much trouble, and the new way only a few have found out. Hence the need of this work, which I have been pressed so much to bring out, but for want of time had to delay until now. At the popular price at which this will be sold I trust everyone will be able to buy it, and will find it a great labor saving, and, in many cases, at less cost than the old way. I will follow the same course here as in the cleaning department, viz., use the plainest language in the simplest form, so that the whole matter can be comprehended easily.

A study will be made, also, to condense all the plain talk into just as many words as is absolutely required to make it clear and plain, and no more, as it is not the writer's wish to produce a work to impress you by its size, but "rather by its usefulness."

NEUTRAL COLORS—WHAT ARE THEY?

They are the colors that require no acid, argols, bluestone or other mordant ingredients to prepare the silk or wool to take up the color, but will in warm, hot or boiling bath take up the color as bright or brighter than by the aid of mordants.

The following is a list of the most useful: Magenta, fuchsine, rosine, three names for much the same article, and dyes a bluish shade of red, Violet or Purple. The name indicates the shade produced. The dye can be bought on the blue, red or medium shade, to suit your purpose.

Green: In this there is not so much difference in the shades as in the names by which it is called. It does not, indeed, matter which shade you get—the so-called blue, or yellow shade, as it is easy to change the

yellow shade and make bluer with the least bit of violet, or the blue with a little yellow (chrysidine). The important point is to get the strongest and brighest color. A good brilliant crystal is as good color as any of them.

Yellow: Chrysidine is, no doubt, as strong a yellow as any, and for mixing purposes I prefer it. There are the yellow and red shades; the yellow is to be preferred, as it is a cleaner color.

Blue: Methyl blue is the only direct blue made that is neutral. This I never use; it is too dear, at about $4 per pound. Eight ounces brilliant green and twelve ounces six B. Hoffman Violet mixed, will produce about the same thing, so I recommend this, as it is less than half the price of the former and will do just the same work. It is very disagreeable to mix, as it gets in eyes, nose, mouth, etc., badly; but those who want it ready mixed can order from me at $2 per lb., as I have a machine for this work. When mixed I call it Victoria Blue, as it is a right royal color.

Bismarck Brown: This is so generally known that nothing need be said, except that there are several kinds of it; some being on the yellow-shade dyeing, as the name implies, a lighter shade than the red one.

From the four colors named I will now produce the colors most useful to the garment dyer.

The colors will be taken in the order given.

FUCHSINE—COMPOUND COLORS FROM.

MAROON.

3 parts Fuchsine,
1 part Red Bismarck.

CLARET.

3 parts Fuchsine,
1 part 4 B. Violet.

CARDINAL.

3 parts Fuchsine,
1 part Chrysoidine.

BROWN.

A red shade can be made as follows:—

Fuchsine, 1 part;
Chrysoidine, 1 part;
Bismarck, 1 part;
Green, 1 part.

Regulate this for any shade of brown.

VIOLET—COMPOUND COLORS FROM.

PLUM COLOR.

6 parts Violet,
1 part Red Bismarck,
1 part Green.

The Bismarck is to darken it; less of that and more of the green will produce a bluer shade.

WINE COLORS.

6 parts Fuchsine,
1 part Violet,
1 part Chrysoidine.

If fuchsine and violet alone are used, a fine bluish color is produced.

OLD ROSE.

Use wine color very sparingly, and vary proportions to suit shade required.

YELLOW—COMPOUND COLORS FROM.

OLD GOLD.

32 parts Chrysoidine,
1 part Green.

OLD GOLD—DARKER.

Add 2 oz. yellow Bismarck to old gold as above.

YELLOW BRONZE.

8 parts Chrysoidine,
2 parts Yellow Bismarck,
2 parts Green.

OLIVE.

Same as yellow bronze, but use 3 parts green.

DARK BRONZE.

4 parts Chrysoidine,
4 parts Red Bismarck,
2 parts Green.

BLUE—COMPOUNDS.

Victoria Blue, alone produces a full rich shade, fairly fast; to make quite fast, see hereafter.

NAVY BLUE.

3 parts Victoria Blue,
1 part 6 B. Hoffman Violet.

PEACOCK BLUE.

3 parts Victoria Blue,
1 part Green,
Or use other proportions for other shades.

BROWN—COMPOUND COLORS.

GOLDEN BROWN.

4 parts Red Bismarck,
1 part Chrysoidine,
1 part Green.

MEDIUM BROWN.

4 parts Red Bismarck,
1 part Violet,
1 part Green.

SEAL BROWN.

6 parts Red Bismarck,
1½ parts 6 B. Violet,
1 part Green.

TERRA COTTA.

1 part Fuchsine,
2 parts Chrysoidine.

MAHOGANY.

1 part Fuchsine,
1 part Red Bismarck.

GREEN—COMPOUNDS.

MEDIUM GREEN.

8 parts Green,
1 part Violet,
1 part Yellow Bismarck.

DARK GREEN.

4 parts Green,
1 part 6 B. Violet,
1 part Red Bismarck.

Having given a general outline of compound colors, it will be easy for any person to alter the proportions to suit any shade required.

If any particular shade is required, send pattern on; it can be matched, and the color supplied, with instructions for use.

COTTON AND MIXED GOODS—PROCESS OF MORDANTING.

All of the neutral colors, as stated, will dye on silk and wool, but on cotton, or cotton and mixed goods, a mordant is required.

I will here give the old way of mordanting, which I have only three faults to find with, viz., time, trouble and expense.

For one hundred pounds goods, or say thirty-five dresses, scald out fifteen pounds Sicily sumac; let goods remain in this in as open manner as possible all night. In the morning let drain, then enter cold bath, in which three pounds muriate of tin or the half quantity of crystals of tin is added; well handle goods in this for half hour, let drain, and then wash off in two waters.

NEW WAY TO MORDANT.

To one hundred pounds cotton, or cotton and mixed goods, or thirty-five dresses, scald four pounds

Bird's Patent Aniline Mordant, at twenty-five cents pound. Let boil or scald for half hour in four gallons water.

Put piece of muslin or flannel over a sieve, or use a hair sieve, and strain the liquor off from the grounds. Now make bath large enough to open goods out in. For all cotton it does not matter how hot, but for goods of cotton and wool only, have it gentle hand-heat; otherwise the mordant will go on to the wool, which is not required.

For mixed goods, half an hour will answer; lift and drain.

If they are for different colors, sort them out. The light colors of mixed goods require to be dyed first.

DARK COLORS—MORDANTING.

After they come out of the mordant handle them for half an hour in the iron liquor you use, for black silk; this will make them a slate color. Wash off from this twice; this makes the goods dark, so they will not require so much color. Now dye same as for light colors; on this mordant and iron. Logwood, or other woods, will work on, for very dark colors, in with the aniline colors.

The light and dark colors are now fit for dyeing.

COTTON AND COTTON-MIXED GOODS.

Dye Bath.—Take ten per cent. Glauber salts and what colors desired. Commence to color at 100° or 110° F. and handle for one-quarter hour at this heat to give the cotton a chance to dye to shade, then raise the heat to dye the wool. All cotton can be dyed at 150° to 200° F. Goods are not washed off from the mordant, but dress goods are best washed in cold water till clean after they are dyed. This process is followed for all colors in mixed goods.

TO FIX ANILINE COLORS ON MIXED GOODS.

On New Goods.—They get no more fixing than what the mordant does; but people are more exacting from the garment dyer than from the dry goods store and expect it to be faster than new. Take about one pound best starch, make a good clean starch liquor, strain it so as to avoid all thick parts. At a gentle hand heat all the dresses can be worked in this; drain, then dry. About one-half ounce starch to each dress will fix it. This does not make it too stiff, neither will it daub or gloss it; if done cold it may, but warm it will not. Even blacks are improved by it; they can be done at a good heat. A punch in this liquor is good both as a wash off and stiffening.

COLOR MIXING FOR FAST ACID ANILINE COLORS.

For this purpose the acid colors are used; that is, colors that will not take on alone, but must have acid to cause them to lift or take on.

At first it was the neutral colors that prevailed in anilines; the chief fault with them was they faded too much. Gradually the acid colors appeared, and have kept on the steady march until we have them in about every shade of straight color, so that I was not so far out ten years ago, when, writing on this subject, I expressed the opinion that the time would no doubt be here when all colors would be dyed fast with anilines. Few scarlets are dyed with cochineal now, and even indigo blue has found its rival, and brilliant black is not beaten in cost, labor, fastness to sun and air or any other test.

None of the colors here used for producing compound shades, rub or crock at all.

COMPOUNDS FROM ACID PRIMROSE.

That very pretty shade of greenish yellow is produced from this:—

30 parts Primrose,
1 part Acid Green.

APPLE GREEN.

1 part Primrose,
1 part Acid Green.

OLD GOLD.

30 parts Strong Yellow.
1 part Acid Green.

ACID BRONZE.

10 parts Strong Yellow.
1 part Acid Green.

ACID OLIVE.

5 parts Strong Yellow.
1 part Acid Green.

DARK ACID OLIVE.

1 part Yellow Acid Orange.
1 part Acid Green.

VERY DARK ACID OLIVE.

1 part Acid Yellow Orange.
1 part Acid Bismarck.
1 part Acid Green.

Any of the above can be darkened with Indigo Induline, Nigrosine or Indigotine, worked in the same bath.

ORANGE—RED SHADE.

Used for deeper shades than the other. Per pound, $0.50.

ACID REDS.

Scarlets, 3 B. or 3 R., is used by different houses for the same shade of bluish tint.

1 B. and 1 R. are the yellowest shades made. The 3 B. is the most desirable to keep in stock, as it is easy to add a little yellow shade of orange to it, if required fiery. 2 B. is the medium shade. These scarlets equal cochineal in brilliancy. Per pound, $0.50.

CARDINAL.

Of this color I believe none will compare to the one I sell in brilliancy and clearness of tone; it dyes quite evenly and keeps its color good; is on the bluish tint. If required bluer, add 6 B. acid violet, by which about the same shade can be got as with acid magenta, at much less cost. Per pound, $0.75.

WINE COLOR.

Darker than Cardinal, and can be used in place of Archil at considerable saving. $1.00 per pound.

GARNET.

This is the darkest shade of red made; like all the foregoing is a straight color. $0.75 per pound.

DARK GREEN.

10 parts Acid Green.
3 parts Strong Yellow Green.
3 parts Indigotine. $1.25.

DARKER GREEN.

Add 3 parts Induline or Nigrosine to Dark Green. $1.25.

VERY DARK GREEN (BOTTLE).

Same as above, only darker, with Acid Black instead of Induline. $1.25.

BRILLIANT BLUE.

A first-class blue can be made with 2 parts 6 B. Acid Violet, 1 part acid green; this in one bath produces about the color of 4 B. alkali or Nicholson Blue. On colored goods this dyes a splendid light navy. $1.50.

LIGHT NAVY.

Add Induline to Brilliant Blue; for dark navy add Indigo, Indigotine or Nigrosine.

ACID PEACOCK BLUE.

2 parts Acid Green.
1 part 6 B. Acid Violet.
This can be proportioned for any shade of peacock.

ACID CADET BLUE.

1 part Acid Green.
2 parts 6 B. Acid Violet.

ACID DARK NAVY.

Fast Acid Navy, darkened if required, with Brilliant Black. This Fast Acid Navy is Indigo shade and quite as fast. $1.50.

ACID MAROON.

12 parts Fast Red or Cardinal.
2 parts 6 B. Acid Violet.
2 parts Orange. $1.00.

ACID CLARET.

12 parts Fast Red or Cardinal.
4 parts 6 B. Acid Violet. $1.00.

WINE COLOR.

14 parts Fast Red.
2 parts 6 B. Acid Violet. $1.00.

ACID ANILINES, SUITABLE FOR GARMENT DYERS.

The following list will be about all that is required to keep in stock. From these, by following instructions on color mixing, anything can be produced.

The colors here recommended ought to be kept by any good color house at about the price named. I sell them at this price.

By following the rules here given, good, even and fast results can be obtained See that the goods are thoroughly clean and washed off, as instructed in the Dyeing Department, after the warm sour bath. From this sour bath lift them into the bath of color you require. Let this be just hand heat, handle in for several turns, then lift and add a little more color and some acid; handle again, raising the heat. This should be repeated two or three times in order to get even results, about 10 per cent. Glauber salts are used to 1 per cent. of anilines; this can go in at the start, but not the whole of aniline or acid, if good, even results are expected. This is why, on old and faded goods, uneven results are had that the color bath is made too strong and too much acid used and the heat too much to start at.

New Goods.—Even these would be better to get half of both color and acid at the start, as the color

gets into the fibre better. But, as in new goods, the facilities are such that the goods can be opened rapidly unless they are thick it is not so imperative, as worsted yarns, etc., are dyed all the time in the same bath at the spring.

THE MOST USEFUL ACID COLORS.

Canary or primrose. No more acid should be used with this than just enough to lift it, as the name implies. It dyes a light greenish yellow of much beauty. Acetic acid is much better than sulphuric for this color. Price per pound, $1.00.

STRONG YELLOW—EXTRA.

A full, bold color, four times stronger than canary, but not so greenish, is good for silk or wool, as all of the colors here named are. It will answer all purposes. Per pound, $0.75.

ORANGE—YELLOW SHADE.

This makes a deeper shade than strong yellow; used for window draperies, etc., and for olives and bronzes; also, for dark greens and yellow shades of brown, etc. Per pound, $0.75.

Cardinal and wine color will work together for shade between them, as scarlet and cardinal will for mid shade. In like manner, wine and garnet can be used for all mid shades. Plum color and prune can be got from garnet by adding indigotine to shade. Per pound, $1.00.

ACID GREEN.

This is a more brilliant color than the greens that will not work with acid; as it will not crock; it should be used on woolen goods. It is rather on

the yellow shade, which gives it life. If required on the bluish shade, just a little 6 B acid violet will do it. As previously shown, peacock, olive, bronze and bottle green are obtained with this color. Per pound, $1.25.

BRILLIANT BLUE.

For a direct color in one bath I know of nothing that will give better results, producing a pure blue, not too red or too blue. Can be made redder with 6 B violet, or greener with acid green. Per pound, $1.50.

NAVY-BLUE ECLIPSE.

All other brands are discarded for this one, for the following reasons:—

First.—This does not smut or crock.
Second.—It will dye evenly.
Third.—Is a true indigo shade.
Fourth.—Will wear well.
Fifth.—Is very strong, therefore cheap.
Per pound, $1.50.

SCARLETS,

For wool, are made in three shades, yellowish or fiery, denoted by different makers as Y. R. B., all which stand for the same shade.

Medium denoted by BB or RR; by others, as the most sensible, 2 B or 2 R.

Bluish denoted by BBB, or RRR, or 3 B or 3 R.

They are all as strong one as the other, although the last named looks the strongest, from the fact of its being the bluest, and is mostly used.

They will all dye as bright as cochineal at much less cost, and, like cochineal, will dye from delicate pink to full scarlet. Per pound, $0.50.

CARDINAL.

This color is now far superior to fast red or rocceline, as it is quite strong and much finer shade, and, what is of great importance, dyes quite evenly, and does not crock.

It will dye equally well on silk or wool. Per pound, $0.75.

P. S.—This color can be used in place of acid magenta, if blued to shade with acid violet.

INDIGOTINE.

The coloring matter of indigo extracted and so treated that it is as strong as aniline colors, and is put up in the same form so that it can be used like it. Is mostly used for darkening olives, bronzes, greens and browns. Per pound, $2.25.

INDULINE.

Is very useful for dyeing grays, Goods so treated are better than those dyed with archil and blue. Drabs can be obtained from it by adding strong yellow, acid Bismarck, etc., to shade, it works evenly; but for such light colors, quite clean, and not sunburnt or faded goods, are required. For light shades dissolve colors separately, and add sparingly, to prevent getting too dark a shade. Per pound, $0.75.

Yellow with it makes olive. Acid Bismarck makes bronze, varying the proportion to suit.

As it is a mild color, it can be used to darken any dark color.

ACID BROWNS.

ACID GOLDEN BROWN.

5 parts Acid Bismarck.
1 part Acid Green.

ACID MEDIUM BROWN.

6 parts Acid Bismarck.
2 parts Acid Green.

NIGROSINE.

This is on the same order as induline, but is redder and deeper in shade. Per pound, $0.75.

ACID MULBERRY.

10 parts Fast Red or Cardinal.
3 parts Acid Bismarck.
3 parts 6 B. Acid Violet.

Per pound, $1.00.

ACID PLUM COLOR.

Add three parts acid green to last in place of Bismarck. A straight, very fast and strong color I now have. Per pound, $1.25.

If expense is no consideration, archil can be used in place of fast red, as it will produce good results on much faded and worn goods for any shade of red.

As indigo paste or indigotine will produce good effects on covering all bad goods for blue green, olive, etc.

For such work less aniline can be used in the same bath with archil or indigo.

ACID BISMARCK

Is a good shade of leather brown; will mix with garnet and navy blue for making many shades of dark brown. Per pound, $0.75.

ACID VIOLET

Will stand much better than Hoffman or neutral violets; for compound colors its use has already been shown. Per pound, $1.75.

FOR BRILLIANT BLACK.

(See particulars, page 72).

From the above acid colors an ordinary dyer should be able to get any desired shade. We can, if desired, send any color to match pattern sent.

ALKALI OR NICHOLSON BLUES.

There are many shades of these, but, as brilliant blue will dye in one bath, these are not so much used now, as they require three baths to dye them perfectly.

First.—One part color, three parts soda. Bring this up to a boil, handling goods all of the time for one half hour.

Second.—Take out from this into cold water. This is not done by many and they wonder why it gets spotted and striped at times; it is because going direct from the dye bath into the acid more of the liquor is held in one part than the other, and produces the stripes, and the scum rests on parts which the acid fixes so fast it will not move. The wash in cold water removes this. After the cold wash it is only a gray color.

Third.—Make up a warm water, add enough sulphuric acid to just taste a little sharp. Handle in this quite open, it will spring or develop it to a good blue. The lightest shade of this one, called "baby blue," is 6 B. The darkest shades are guernsey. They are all dyed in the same way; 4 B. is the medium shade and most kept in stock. 4 B., per pound, $2.75.

Silk and wool are both dyed in the same way, except that silk is only dyed at the spring.

This class of blues are called fast. As far as smuting goes they are fast, but will fade quite light.

They stand washing very well as far as this, the color considerably lightens by it, as it loses the acid that developed it; and has, therefore, to get another acid bath after the soap has been well washed out in warm water. If, however, other colors are in combination with it, that will not stand acid, alum may be used in its place; in which case it will require to stand in the liquor longer than in a sulphuric acid bath.

NEUTRAL OR SWEET COLORS.

I will name those that ought principally to be kept in stock. No acid should be used with them. Will dye on silk and wool without a first mordant. Cotton, or cotton and mixed goods, must be mordanted. See Mordants.

SAFFRANINE.

Use for cotton and silk. Pinks will take without a mordant on both, but will be faster on the cotton with a mordant of tin. See Mordants. There are three shades of saffranine, from bluish to yellowish. Per pound, $1.50.

EOSINE.

More on the salmon shade of pink. Dyed in the same way. Per pound, $1.75.

PHLOXINE.

More bluish. A fine color, dyed in same way. Is more bluish, and by far the finest pink out. Will dye on silk and wool with alum, but is little used on the latter. On silk, feathers, and flowers it is much used. On cotton it requires the usual mordanting. Almost the same shade can be gotten with the bluest shade of cotton scarlet, which can be dyed

with alum in it, only as a mordant. This costs less but is not so fast, as, if water touches it, it runs.

CHRYSOIDINE.

Will dye on wool or silk, but is mostly used for cotton and mixed goods, which require mordant. See Mordants. It is used in place of fustic and turmeric. Per pound, $0.75.

BRILLIANT GREEN.

The best of all neutral greens. Per pound, $1.50.

BISMARCK BROWN.

Some new goods are dyed this direct color, but it is mostly used for shading purposes by garment dyers. Per pound, $0.75.

BROWN (MEDIUM).

A compound color (see compounds); will dye on wool or silk; requires mordant for cotton and wool mixed. Can be made lighter with chrysoidine or Bismarck, and darker with seal brown. Per pound, $1.00.

SEAL BROWN.

Will color silk and wool, but cotton and cotton and wool mixed must be mordanted. See Mordants. Per pound, $1.25.

FUCHSINE.

Will dye wool and silk, cotton and cotton and wool mixed must be mordanted. Chrysoidine used with it will make goods cardinal. Per pound, $1.25.

PONCEAU.

Deeper yellow shade than fuchsine; in other respects the same and dyed the same. A strong color. Will mix with Bismarck for yellower shade, and with violet for bluer shades, or all three for dark shades of maroon and garnet. Per pound, $1.25.

Wine color and garnet can be had ready mixed, if desired. Per pound, $1.25.

COTTON COLORS DYED WITH ALUM IN ONE BATH.

As many garment dyers take in cotton yarns, jute, etc., to dye, I will give a few examples of the cheapest and quickest way of dyeing these.

ONE DIP COTTON YARN DYEING ORANGE.

Either yellow or red shade (yellow is preferred) is dyed in a bath at a little under the boil. To 100 pounds goods start with five pounds orange, 10 pounds Glauber salts, 4 to 5 pounds alum; work half hour, drain, wring and dry. Second and following baths, 2 pounds orange, 10 Glauber salts, 4 alum. Cotton orange, per pound, $0.50.

Note.—None of these cheap alum colors must be washed off, or the color would partly go.

BLUE—100-POUND COTTON.

6 ounces cotton blue, 10 pounds Glauber salts, 6 pounds alum; work to shade, drain, wring and dry. Second lot takes only 3½ ounces blue to produce a good shade of color. Will dye silk a splendid color with sulphuric acid from the pale shade to light navy. Per pound, $1.75.

SCARLET

Dyed the same as orange. Will dye pink and scarlet on silk with acid. Cotton scarlet, per pound, $0.75.

COTTON PINK.

Dyed same as orange, only use from 2 to 4 ounces and 3 pounds Glauber salts and 1 pound alum. Send shade required, as there are seven shades. Per pound, $1.00.

SHRIMP COLOR.

This is obtained with the scarlet and orange. Dyed same as pink.

CARDINAL.

Dyed same as orange, only use cotton cardinal. Per pound, $1.00.

BROWN.

4 pounds Cotton Brown, 4 pounds Alum, 10 pounds Glauber Salt; second lot, 3 pounds Brown, 4 pounds Alum, 10 pounds Glauber Salt; third lot, 2 pounds Color; fourth and after lots, 1½ pounds Color, 4 pounds Alum, 10 pounds Glauber Salt.

Per pound, $0.75.

This colors much darker than Bismarck, and colors quite evenly; is fairly fast as regards smutting, but, like the rest, will not stand wetting. The same remarks refer to the following seal brown.

SEAL BROWN—CUTCH SHADE.

First lot, 5 pounds Cotton Seal, 5 pounds Alum, 10 pounds Glauber Salt; second lot, drop 1 pound Color; third lot, drop 1 pound Color; fourth lot, drop 1 pound Color; fifth lot and after, 2 pounds Color. 4 pounds Alum and 10 pounds Glauber Salt is used in each lot.

Cotton seal, per pound, $1.00.

COTTON MAROON.

Dyed with cotton cardinal, darkened with cotton brown.

COTTON GARNET.

Dyed same as cardinal; darken the cardinal with cotton seal.

BRONZE AND OLIVE.

All shades can be got with chrysoidine, yellow, orange, Bismarck and green, with alum and Glauber salts, varying the ingredients to suit your shade. All the above are as bright as any colors on silk or wool, and will wear well, but will not bear wetting, as they run easily.

Piece goods that get stiffening enough to hold the color can be dyed by this method at a cheap rate. The colors in awnings, bed ticks and lots of things are dyed this way, but they ought not to be.

JUTE DYEING.

Unbleached jute will take up any of the neutral colors, without mordant, dyed at about a spring heat. Four ounces of many of the colors will dye 50 pounds.

The acid colors can be used if about 4 pounds alum to 100 pounds of yarn is used in with the color; no acid should be used with jute, as it soon rots it.

BLEACHED JUTE DYEING.

Bleached jute is used to imitate linen. To dye this it requires first to be mordanted and dyed same as cotton. See Mordants.

FLAX DYEING.

Follow same instructions for mordanting and dyeing as for cotton.

STRAW DYEING.

I claim to be the first to introduce the one-dip dyeing of straw, and have thereby helped to build up several large firms by learning them this quick and easy process. In their cases I made and sold the colors that required compounding, they preferring to buy it so for the sake of conformity.

For the first time I here publish the method, or to be more exact, the quantities, of each color that was used for each shade. The reader can mix it according to the proportions given, or can send here and get it prepared at the prices given.

SILVER GRAY.

30 parts Induline,
1 part New Cardinal.

It will be understood that in every case a small quantity will produce a light shade, and larger quantity darker, so that fully six good shades can be got from one color. Per pound, $1.00.

DARK GRAY.

Same as silver gray, with one ounce indigotine added. Per pound, $1.00.

LIGHT DRAB.

20 parts Induline,
1 part New Cardinal,
2 parts Strong Yellow,
1 part Acid Bismarck.

Per pound, $1.00.

DARK DRAB.

20 parts Induline,
2 parts New Cardinal,
2 parts Acid Bismarck.

Per pound, $1.00.

STONE COLOR.

Silver gray and dark gray in equal proportions.

LIGHT SLATE.

30 parts Nigrosine,
1 part New Cardinal,
1 part Acid Bismarck.

Per pound, $1.00.

DARK SLATE.

15 parts Nigrosine,
1 part New Cardinal,
1 part Acid Brown,
1 part Indigotine.

Per pound, $1.10.

ECRU.

On top of mordant, chrysoidine in small quantity will produce this shade.

BEIGE.

On top of mordant, give yellow, nigrosine, and cardinal, each very sparingly to shade.

CADET BLUE.

On top of mordant, color with 4 R. alkali blue, wash off in slightly acid water. Red shade navy blue may be used instead of alkali blue.

ECLECTIC BLUE.

On top of mordant, color with fast greenish blue. Per pound, $1.25.

NAVY BLUE.

Per pound, $1.50.

All the above colors, as, indeed, all light colors, require a mordant.

The best in all respects is patent aniline mordant, as it is clean, bright and cheap.

PRIMROSE OR CANARY.

By some, this is dyed with picric and little acid; have seen men's hands badly poisoned by it; besides it does not keep an even color long if the damp gets to it, I therefore recommend aniline primrose for it. Per pound, $1.00.

APPLE GREEN.

This is got by adding green to shade to aniline primrose.

YELLOW.

Straw yellow is dyed with strong yellow. Per pound, $0.75.

DARK YELLOW.

Dyed with Chrysoidine Y., darker shade with Chrysodine R. Per pound, $0.75.

OLD GOLD.

Straw yellow shaded with green; for darker shade add a little Bismarck.

STRAW MORDANT FOR LIGHT COLORS.

To 100 pounds straw take 2 pounds mordant in boiling water. It is a good plan to beat it up first into a thin paste. Boil braid in this from ½ to 1 hour, according to thickness of same. Second lots only require 1 pound to 100.

The mordant gives a body, brightens the color and holds it, beside the fact that it causes the braid to take a level color; no wash required from mordant. Per pound, $0.25; in barrels, $0.18 per pound.

STRAW MORDANT FOR DARK COLORS.

All that is required for the following colors is to soak the braid in boiling soda liquor till they are thoroughly soaked through; from this let them drain, no wash is required. All the following colors will then take quite through the thickest plait.

BRIGHT RED.

New cardinal is by far the best for this, it will dye from pink to cardinal, is very clear and bright. Per pound, $1.00.

DARK RED.

Straw garnet, about 7 ounces to the bale. Per pound, $1.25.

MULBERRY.

12 parts Straw Garnet,
2 parts Violet,
2 parts Bismarck.

Ready mixed, per pound, $1.25.

PLUM COLOR.

12 parts Straw Garnet,
3 parts 4 B. Violet,
2 parts Bismarck.

Ready mixed, per pound, $1.40.

GREEN.

No better green can be used than brilliant crystal. Per pound, $1.50.

PEACOCK.

3 parts Crystal Green,
2 parts 6 B. Violet.

This can be varied to any shade. Kept mixed, per pound, $1.75.

BRIGHT BLUE.

4 B. Nicholson or alkali blue is used. Brilliant blue produces a good shade, as it is as strong at less cost. Per pound, $1.75.

NAVY BLUE.

1 part Green,
2 parts 4 B. Violet.

Ready mixed, per pound, $1.60. Nigrosine will darken. Per pound, $0.75.

YELLOW BROWN.

8 parts Chrysoidine,
4 parts Bismarck.

GOLDEN BROWN.

8 parts Chrysoidine,
8 part Bismarck,
1 part Green.

BRONZE.

10 parts Chrysoidine,
1 part Green, or vary it to suit.

DARK BRONZE.

Add as much green as desired to yellow brown or golden brown.

DARK NAVY.

3 parts 6 B. Violet,
1 part Green.

Brilliant aniline black will darken if required. No other method will equal this for a good, solid, cheap color dyed easily. Per pound, $1.75.

MEDIUM BROWN.

8 parts Bismarck,
1 part 4 B. Violet,
1 or two parts Green, according to shade required.

Per pound, $1.00.

DARK BROWN.

6 parts Bismarck,
1 part Green,
1 part Violet, or vary to shade.

Per pound, $1.00.

SEAL BROWN.

4 parts Bismarck,
1½ parts Violet,
1 part Green, or vary to shade.

Per pound, $1.25.

DARK GREEN.

8 parts Green,
2 parts 4 B. Violet,
2 parts Chrysodine.

Ready mixed, per pound, $1.60. This is a first-class color.

BOTTLE GREEN.

8 parts Green,
4 parts 6 B. Violet,
2 parts Bismarck.

Will give good results. The amount of aniline for dark colors is about seven ounces to a bale. Per pound, $1.75.

REMARKS ON STRAW DYEING.

The light colors can be dyed in one hour; the medium require longer. The dark ones are boiled in from one to two hours, and, in the case of thick braids, they are allowed to cool down and stop in from four to eight hours, or all night; they do not get uneven by this, as the color has been already taken up, but stopping in the liquor causes the surface to give out part of its color to the inner part, so that if it gets dyed through, it will soak in and be thoroughly colored through.

BLACK ON STRAW.

It is very easy to dye a black, but the sort of blacks some get bothers them a good bit. I think the following will please everyone, as it is not expensive at the start, and, as the bath can be used several times, about one-third less drugs can be used for after lots.

Logwood chips (best), 9 lbs.;
Patent mordant, 2 lbs.;
Turmeric, 9 oz.

Boil two hours, steep in bath of acetate of iron at 4° B. till black. The proportion of drugs are given, but, as braids differ in weight, the dyer must regulate that point.

WASHING AFTER DYEING.

As scum, etc., gets fixed on in dyeing, all colors should have a good cold wash off.

PATENT MORDANT AND SUMAC COMPARED.

Sumac has been a good servant, but for delicate colors it gives too much stain. Its worst feature is its dust. This causes much trouble to wash of, but can be avoided, however, by using extract of sumac.

But, where the room for bulky articles is a consideration, patent mordant is preferable, and, as it is many times stronger, it is cheaper than sumac, and has very little sediment. The little it has can be easily strained from it, so for straw it is much cleaner.

BLEACHING STRAW.

After a soda liquor, wash off, and give a weak chloride of lime. After this, if not white enough, give it the sulphur chamber.

Second.—After the soda wash off, and pass them into a weak muriatic warm bath and wash out. This will make speckled braid much cleaner at small cost.

This acid is the mildest, and does not make it brittle like sulphuric.

Third.—Salts of sorrel, used in same way.

Fourth.—Salts of lemon, used in same way.

Fifth.—Oxalic acid, used in same way.

YELLOW TINT ON STRAW.

This is green with aniline primrose, or picric acid, after the bleach, in the wash-off water.

COTTON DYEING—FAST COLORS DYED IN SOAP.

These new colors are useful to the garment dyer in case he gets theatrical work, as they will dye fast colors on cotton tights, etc.

SOAP YELLOW.

Dissolve the color and add it to a warm soap bath, and handle in till deep enough; then wash in cold water.

FLESH AND SHRIMP COLOR.

Soap B. Red, dyed in the same way as yellow.

SOAP PINK.

No 4 B. red dyed in same way.

CARDINAL.

4 R. red dyed in same way.

NAVY BLUE.

There are three shades of blue. They are used in same way.

SOAP GREEN.

Soap green is made with the yellow and blue, and by varying them olive can be made.

BROWN.

With yellow, red and blue different shades of brown can be got.

PLUM COLOR.

This is obtained with red and blue.

DRAB AND SLATE.

Can be produced from yellow by adding blue or red, or both, to shade.

The yare expensive colors, ranging from $1.50 to $2.50. For light colors they are very cheap, but for dark, unless there is a run on them, they are dear, as the bath has to be strong, but by adding a little every batch can be used many times. It will dye the shade of turkey red fast.

They cannot be kept but a few days when dissolved in a soap bath, or they will turn mouldy, so if you have not a run on it, it may as well be cast away at once after using.

ONE-DIP WOOL VEGETABLE BLACK.

To one hundred pounds liquid extract of logwood add ten pounds bluestone and six pounds copperas, both finely powdered, well mixed; it is then ready for use. To color one hundred pounds of white wool, dissolve forty pounds of paste, add enough oxalic acid or sulphuric acid to turn the bath a seal brown.

Enter the wool and boil about two hours; if black, lift and wash; if it has not oxidized or turned good black, add a little soda or ammonia to kill the acid; this will produce a good black that will wear well. Second lot, twenty pounds paste; third lot and after, sixteen pounds paste.

For old rags or dark colors, one-half quantity will do.

Considerable of the above has been used to advantage, but the introduction of brilliant black will put all other methods in the shade.

ONE-DIP VEGETABLE COTTON BLACK.

To one hundred pounds liquid extract of logwood add twenty pounds extract hemlock, ten pounds finely powdered bluestone, well mixed into paste. About sixty pounds of this is required to start first bath for coloring one hundred pounds. When dissolved it will be seal brown. Add just enough soda to make the bath good black, enter and bring up to boil. As soon as it is a good black it can be lifted and aired out, as it will jet on exposure deeper. It will then be well washed off. Garments, etc., so dyed require a good soap liquor to cleanse them.

This is called a fast black, because a soap wash improves it if done at only hand heat. Second lot use forty pounds, third lot use thirty pounds, fourth and after lots, twenty pounds.

ONE-DIP NAVY BLUE.

Good indigo shade can be got on cotton or mixed goods by using about twenty pounds of the paste and four ounces of 4 B. violet, which can be used in the same bath.

ONE-DIP VEGETABLE BOTTLE GREEN.

Done the same way, only use four ounces green.

ONE-DIP VEGETABLE SEAL BROWN.

Done in same way, only use four ounces to eight ounces cotton orange.

DYEING SILK BLACK.

Out of all the processes I know, I will only give two, for the reason that they are as good as any that can be found, and will save confusion of choice.

First.—All drab silks, stripes and checks especially require, after cleaning in soap and soda and washed off, to pass through a hot bath of nitric acid, composed of one pint acid to one gallon of water. This will, in about ten minutes, clear off all the old colors, and make them a yellow bottom, so striped goods will dye alike, and the sumac or tanning cut down that may be in the silks, and which prevents them taking a good color. Wash in one cold and one warm water, then lay down open in cold nitrate of iron bath all night.

To make the iron liquor, use one gallon nitrate iron to eight gallons water, and add about one-quarter of iron every lot after. Rinse well out of this in two cold and one lukewarm waters.

To Dye.—in a strong decoction of logwood, made from chips, add oil soap to soften, handle in this as hot as the hands will bear; when black pass them through a clear oil soap to clear them, then hang without a wash quite open in hot stove-room. All silks are much more glossy if dried in a hot room. If a jet black is required, four parts logwood, one part of fustic is used. Of course, all light colors go in dye first, and the others follow in order; faded blacks last.

TO DYE SILK SPLENDID BLACK IN TWO HOURS.

TO COLOR TWO HUNDRED YARDS, OR SIXTEEN POUNDS OF SILK.

Prepare a hot solution of nitro-sulphate of iron, 5° Twaddle (150° F.), work in this one-half hour, then wash in two cold and one warm waters. Have ready and enter under the boil a fustic bath, made with eighteen pounds. In one-half hour lift, and have ready a logwood bath of sixteen pounds; enter this under the boil, after adding one pound oil soap previously dissolved. Winch or handle in this for half an hour, lift and dry in hot room. Nitro-sulphate of iron is made as follows: Dissolve four pounds copperas in five pounds nitric acid, by adding more copperas as fast as it dissolves. When dissolved, add it to two gallons water. Two gallons of this to twenty gallons of water will give good results. About two quarts of the iron liquor can be added every time it is used.

Anyone can make this iron liquor, as it does not fume like nitrate of iron, and is much cleaner.

ONE-DIP ANILINE BLACK ON SILK, PERFECTLY FAST.

I do not give this as superior to or cheaper than the two formulas from logwood above given. It is a fair color, and dyed in one bath, and that, to a busy man, is something.

Experience is the principal thing to assure success. Dissolve brilliant silk black, and add it to a bath of water as hot as you can bear your hands in it, the usual quantity of Glauber salts, and just enough sulphuric acid to lift the color. There is no loss in making a strong color, as after the silk is dyed the balance will help the wool blacks. When finished the silk can pass through a hot soap bath and dried in a hot room quite open, or it can simply be washed off in water.

The operation will take from one to two hours. When complete to look through it, the same appearance of bluish slate black will be seen as in logwood and soap bath.

SHEEPSKIN DYEING.

For cleaning them, which they require before dyeing, see page on cleaning.

They are dyed in three different ways :—

First.—Dissolve the color and add it to a bath which is kept at about 100° F., handle in for a time, then let them remain awhile, handle again, and so on, till they are the color required.

Second.—Add dissolved color to square wooden shallow trough, the liquor can here mark 150° to 175° F. Let one man be at each end, each holding two corners. Let one gradually lower until the wool which is undermost touches the liquor. Now one slowly lowers and the other slowly raises quite evenly until all has passed through without touching the back. Keep repeating until nicely dyed.

Third.—A frame is made of wood 1 inch thick by 2 inches wide, in the centre of which holes are pierced; this frame should be about the size for the skin to fit inside. Lay the frame on a table and the skin inside. Then get needle and twine, stick the needle into the skin with the wool under. When the twine is fixed to the skin, thread it through the nearest hole in the frame, then in the skin, and so on until it is sewn all round and tight like a drum. Now cords and pulleys are arranged so that the skin can be lowered down to a kettle, the correct size, with the color in, when the steam is turned on until it reaches about 150° F. The wool is thus dyed without touching the skin. When dyed, wash off with it still on the frame and dry it on the frame; it will then be straight.

Any of the colors mentioned for wool will dye them; the acid colors, however, are the best, as they do not rub, and wear better.

TO MAKE SKINS AS SOFT AS KID.

After dyeing or scouring, if the skin is, when dry, found to be hard, the following will render it quite soft:—

Pour two quarts of bran, that has been scalded, into a flat-bottomed tub large enough to hold the skin; when lying open add to this a handful of salt and a tablespoonful of alum. When cold see that there is just enough liquor to cover the skin and lay in flat three days, then lift and dry, not wash. Proportions given are for about 30 x 18 inch size.

SPECIAL TO GARMENT DYERS.

Brilliant black. Fast acid aniline in one bath. Dyed sample:—

This aniline is not to be confounded with any other aniline black on the market. Not one of them can touch it for its fine qualities.

It is not a mixture, but a direct color. It is not called fast and then instructions given to soap, wash or lime it to make it so. But is *absolutely fast*, only requiring to be washed in cold water, when it will stand acid, alkali, sun, air, and wear well in every particular.

This is not the color sold at 50 cents per pound with instructions to use from four to six pounds to one hundred pounds of goods; when ten pounds will be required to dye one hundred pounds. But this will color one hundred pounds of goods at from three to four per cent., according to color of goods at start and the quality and nature of the goods.

It is not called black and yet requires other drugs with it; but is the *most brilliant black* ever seen, and will make every color a real good shade. Even plaid goods and stripes come a good even color.

This black does not turn green like others.

DIRECTIONS FOR USE.

Dissolve the color in boiling water, then add one per cent. of sulphuric acid as of color used, and two and one-half times the weight of Glauber salts. Enter goods at hand heat, well open out and bring slowly to boil. Boil till color is taken up, as this color will take up to a clear liquor just the same as any other good acid aniline. Lift into cold water, open out, put up smooth to drain, then dry. Now see if you ever saw a better black in your life. It is equal to the world-famed blacks dyed in Europe from an indigo bottom.

SPECIAL ADVANTAGES.

First.—It is dyed in less than half the time of any other black, and other lots can be dyed in same bath by adding required color and sulphuric acid.

Second.—It requires no cleaning off or limeing.

Third.—The linings are clean, only a pale silver shade of gray.

Fourth.—It covers the button-holes and silk stitchings and silk linings better than any other black.

Fifth.—Goods of silk and wool mixed, if a stronger color is made up, and the silk dyed in it before the heat is raised much, will come black. Then add more water and raise the heat to dye the wool.

Sixth.—At first cost it is cheap, and, all things considered, is really cheaper than logwood black.

Seventh.—The garment dyer will find it a *great boon,* from the fact of the goods requiring no mordanting and only the one boiling. They do not curl up and twist all out of shape, so will press up in half the time, and not have half the creases in of any other process, and takes through seams good.

N. B.—My reputation and veracity I prize, but am prepared to stake it all on the representations I have made with regard to this *wonderful black.* I certainly consider it one of the greatest achievements of modern chemistry. Unlike most inventions, having their merits and demerits, this has no drawback, and leaves nothing to be desired. Having most thoroughly tested it, I am placed in a position to confidently affirm all I have stated, and the testimony of every one to whom I have sold it confirms my own in every respect.

Send for trial sample to F. J. Bird,
2106 Columbia Avenue,
Philadelphia, Pa.

EIGHT SPLENDID COLORS IN ONE BATH.

Eight new colors after the nature of brilliant black can be dyed in the same bath on woolen goods, one after the other, as follows:—

BRILLIANT BLUE—FIRST DYED.

Just the same as instructions for black, namely: one part blue, three parts acid, ten parts Glauber salts. No blue surpasses this in shade, and it is quite even and fast. Can be made any shade of navy by darkening with brilliant black.

BRILLIANT GREEN—SECOND DYED.

Dyed the same way. This can be darkened, if required, with the black.

BLACK—THIRD DYED.

Follow instructions for brilliant black.

GARNET—FOURTH DYED.

Use brilliant garnet in same way, as the black exhausts all the color. The garnet will be just as bright as though it had a fresh bath

BROWN—FIFTH BATH.

Use brilliant brown or brilliant seal, according to shade required. Dyed same as others.

All are warranted fast colors.

After the last, if there are olive browns or bronze greens to be dyed, do them in the same bath by giving yellow with brown and indigotine to shade. For the bronze, add strong yellow to the green.

ONE-DIP BOTTLE GREEN.

Done in the same way, only use four ounces green.

ONE DIP SEAL BROWN.

Done in same way, only use four ounces to eight ounces orange.

VELVET AND PLUSH DYEING.

More significance is attached to the proper handling of these in the cleansing and dyeing than is generally imagined. From first to last they should not be doubled or crushed. If they are, when wet, they will show it when dry.

If it is in small pieces, tack them together strongly, not by the ends, but by the long way, and as much as possible into squares, so they can be handled by the straight edge or selvage, and floated with both hands backwards and forwards in cleansing, washing off and dyeing. Each time they are lifted out lay the back of the first piece down; the face, of course, is now up. Second piece face down on top of first face, etc., till all is out.

After they are finished let them so drain for a time; then turn them so all parts can drain alike. Before they get dry take one piece at a time and shake it on all sides; this will both raise the pile and free it from wet, so the pile will not fall again. Then pin it up out in the air, so that the air blowing through will still help to raise the pile.

For finishing same, see page on finishing.

Valuable velvet, however, should be finished as follows: Lay each piece down on a table, and tack cloths on to fill out all parts into a square. Now with hard brush pat it on to a hand-frame, which is made as follows: Take four strips smooth wood, 6 feet long, $2\frac{1}{2}$ inches wide, $\frac{1}{2}$ inch thick; pierce holes in this, two and one-half inches apart; then put square pieces, $\frac{3}{4}$ inch thick, on each end and one in the middle, having one of the pierced pieces under

and one on top; now screw them so, and the other pieces the same. Now make two more pierced strips, say 3 or 4 feet long. The two long ones must have frame pins in, and the short ones will slide in between, so that the velvet can be stretched into full shape and kept tight by nails being dropped into the holes.

The velvet has the under part down, which can be sponged with size, only not enough to wet the pile; then held over charcoal fire or other heat to cause steam to rise through. Any part that may be crushed should be brushed while steaming.

All garment dyers in the old country finish their velvets so.

The same frame could be made do for small crape shawls, and can be made large enough for large ones. In that case they have to be made stouter. I had three sizes, as I prefer them framed to cylindered.

PROCESS OF BLEACHING OSTRICH FEATHERS, ETC.

By means of peroxide of hydrogen, fifteen volumes capacity.

First.—Wash the feathers with castile soap, and rinse them thoroughly with lukewarm water in order to remove all the grease and soap which may stick to the flue.

Second.—Soak feathers in a bath composed of one gallon of ammonia 20° Be. to every eight gallons of plain water for about eight to ten hours.

Third.—Take feathers out of this bath and squeeze out the excesss of ammonia which is in the flue by passing feathers through a wringer.

Fourth.—Put feathers in a bath composed of five gallons peroxide of hydrogen, with addition of twelve to sixteen ounces of ammonia; let it work slowly, stirring feathers from time to time for about six hours; after six hours working, put feathers in one side of the bath and add five gallons peroxide of hydrogen and three to four ounces of ammonia. Stir the bath well so as to insure the mixture of the peroxide with the ammonia. Then let the bath work for nine to twelve hours more; after that time add again two or three ounces of ammonia. The peroxide will work yet for twelve hours more until it gets exhausted, and you may ascertain the fact by the following process:—

Take a small quantity of the bath in a tumbler and throw in a few crystals of permanganate of potash; should bubbles of gas appear, it is proof that the peroxide is working; yet, if none appear, it is proof that the peroxide is exhausted.

Then the feathers have to be rinsed three or four times in lukewarm water, and then to be put in a second bath of peroxide of hydrogen, which has to be prepared as follows:—

To two and one-half gallons peroxide of hydrogen add two and one-half or three gallons plain water and eight ounces of ammonia, and put in the feathers. Let the bath work so for ten hours, and after add again two ounces of ammonia as before, and it will then work twelve hours more until it is exhausted.

Everyone who will follow carefully the above directions will succeed to make white the darkest gray feathers, say ten pounds of feathers by using about seven to seven and one-half gallons of peroxide. After the feathers have been taken out of the peroxide bath they must be rinsed thoroughly with lukewarm water two to three times, and after soaking them again in a soap solution for six to eight hours, rinse them in lukewarm water in order to remove all soap and dirt remaining in the flue.

TO BLEACH FEATHERS WITH BIOXOLATE OF POTASH.

To one gallon of cold water add from one-sixth to one-eighth of an ounce. Let them lie in from fifteen to twenty minutes, then rinse in cold water.

For feathers which have to remain white, the bath should be composed of one and one-quarter ounces bioxolate of potash and one and one-eighth ounces oxalic acid to one gallon of cold water; lay down in it till perfectly white. Wash off in warm water.

TO MAKE CLEAR WATER FOR BLEACHING, ETC.

Put a faucet four inches from the bottom of any ordinary clean barrel, in which let water stand until it has settled clear.

When this is used, wash out and fill again. If it happens to be in a dusty place, of course, it requires covering over. If it does not get clear without, add one grain of alum to every gallon of water, or from two to three drops of muriatic acid.

BLEACHING LIGHT-COLOR FEATHERS WHITE.

(From Practical Feather Cleaner and Dyer.)

Old, faded light colors that you are desirous of bleaching white can be accomplished in the following way:—

Wash thoroughly in warm water, using soap. Add a small pinch of soda, after which rinse in three warm waters. Dilute in clear bowl or basin one-quarter ounce of permanganate of potash in one gallon of boiling water. Enter feathers and let remain in bath about one minute, continually

agitating in bath with clean glass stick; after which you will notice that the feathers have assumed a light, full brown color. Take out of the bath but do not rinse them; let the loose color drain off for a few seconds, meantime empty bath and rinse your bowl thoroughly; then dilute half an ounce of oxalic acid or sulphurous acid in one gallon of boiling water. The water must be absolutely clean.

Enter feathers, and let them remain in until all the color has entirely disappeared, gently agitating while in bath. After the bath has become transparent and the feathers white, which will take about two minutes, empty out about two-thirds of the bath, and add cold water to reduce to hand heat, then add a small handful of starch and a drop of delicate violet, and enter your feathers and let them remain in about one minute; squeeze out and dry in starch. Blue you will generally find the hardest of all light colors to remove for white. The moment it enters the oxalic bath, it generally, to a more or less extent, developes the color again. Such being the case, after rinsing in lukewarm water to remove acid, return to a weak soda bath for a minute, and then rinse and return to permanganate bath, rather weaker than the first one; in other words, repeat tne first operation all through, only in weaker solutions.

This process can be used successfully in bleaching all light colors white. In bleaching natural blacks, however, it would not be practicable.

FEATHER DYEING.

Feathers, like silk, will take on most of the aniline colors. For cleaning, lay them down in warm soda, with a little soap in the liquor. Keep them warm in this for one hour, then gather them up in the hand by the stems and work them backward and forward to free them from all impurities. Then

wash in several warm waters. Now give them a warm sour of sulphuric acid, just enough to make it taste tart.

While they lay in this sour bath get all your things on table to dye them. The lightest shades commence first.

The dark ones can be dyed best in copper or glazed ware. Dissolve the color and add it to the warm water by degrees to prevent their taking on unevenly, which they will do in too strong a liquor, without washing from the sour, only drain them. Then enter dye-bath, and with the hands and a glass rod keep them in motion so that the color will get into all of the parts. Get them even in color in this dip, then lift and add a little more of the color, If it is a neutral color you are using add no acid, but if an acid color, add a little to it now before entering them again. Always stir up the color and acid before entering the feathers. Now work again in same way.

For dark colors the bath will require to be stronger than for silk or wool dyeing, and they often require to lie in under boil for one hour, to get the color even and dark and the stem to match. If it is a thick, hard stem that does not take, dip a finger in ammonia and rub it on; this will soften it, then let it lie in till dyed. When dyed, wash off till clean and finish up.

Strong colors will keep several days for re-use by adding to them.

Any of the neutral or acid colors as described in this book, both straight and compound, can be used on feathers.

Colors are so cheap that most people can keep a one-pound can of each desirable color from which they can dye the straight colors and make the compounds. If, however, the purchaser of this book, who only uses the colors in a very limited quantity, desires to be supplied with 25-cent boxes, on receipt

of P. O. order or cash, I will send as many or as few lots as requested. Patterns should be sent of the shades required, and if any questions are asked with the order an answer will be sent with the colors.

I wish it to be distinctly understood that goods thus matched to order expressly for a customer will not be shipped on credit or on C. O. D., for the reason that no time can be given to the booking and looking-up of such small sums; and many compound colors have to be mixed to shade and would not suit others' trade, so if returned the mailing and the color would be lost.

WONDERFULLY QUICK WAY FOR DYEING FEATHERS BLACK.

(From Practical Feather Cleaner and Dyer.)

Clean off, then prepare by diluting a quarter pound of turmeric in a gallon of boiling water and bring to a boil; after which enter your feathers, and let remain in bath about five minutes, keeping them well under the surface, and gently moving while in bath; after which take feathers out and rinse twice in clear cold water. Meantime dilute one pound of logwood in about one and a half gallons of boiling water, and boil for about fifteen minutes, after which take feathers out and rinse twice in clear cold water. Meantime dilute one pound of logwood in about one and a half gallons of boiling water, and boil for about fifteen minutes, after which enter your feathers, and let them remain in bath about four minutes, then take out and rinse thoroughly in two waters. Dilute one ounce of bichromate of potash in one gallon, more or less, of boiling water, enough to completely cover up your feathers, dissolving bichromate of potash thoroughly. Enter your feathers, let them remain in bath about three minutes, after which take them out and rinse thoroughly.

Meantime have logwood bath boiling, and return feathers to it. Cover up, and let them remain about eight minutes; take out and rinse twice as before. After rinsing, prepare a bath of about half an ounce of bichromate of potash and salts of tartar, about the size of a pea, in a gallon of boiling water; dissolve thoroughly. Let them remain in bath about three minutes; after which take out and rinse thoroughly in cold water. Then mix a bath of hot soapsuds, and enter feathers; wash well and rinse in lukewarm water. The washing and rinsing is not absolutely necessary; in fact, it cannot much improve what is already a clean, glassy black. Washing, however, if productive of a change at all, must be beneficial. Then proceed to mix a small handful of starch in a small quantity of cold water, pass feathers through and dry. While your feathers are in the bichromate of potash bath, they must be kept moving in bath constantly and well under the surface. There is nothing to be added to make a successful result, except it be to caution you to adhere as closely as possible to the recipe.

It often occurs that feathers are brought in to be dipped over that have faded out, or have grown rusty-looking from exposure to light and long wear. The color can be restored by simply passing them through the last two baths for the same length of time that is allowed to the regular recipe. During the process of drying black be sure to have the starch beaten out as fast as it dries. It is best to dry them in the open air, and, if possible, allow them them to hang in the sun for a while, as it improves the color. One especial advantage this black has over most others, is that it improves with age, and the black grows more intense.

For those who wish a good book, devoted entirely to feather cleaning and dyeing, I refer them to the Practical Feather Cleaner, Bleacher and Dyer, by Alexander Paul. Published by Mrs. Dr. M.

Frank, *Textile Colorist* office, 506 Arch street, Philadelphia, Pa. Price $10.00.

It is quite a valuable work, of one hundred and ninety pages, and treats of the new and old methods, giving fifty dyed samples of the new. Having examined the same, I take pleasure in recommending it, and on receipt of price will forward it, post paid, to any address.

WHY USE ANILINE COLORS.

The reasons for confining the formulas to aniline colors are as follows:—

First.—The old plan of boiling out woods and mordanting almost everything is too tedious and expensive for this progressive age.

Second.—Quite as fast colors can now be obtained in one-quarter the time at less expense.

Third.—Good, even results can also be attained if my instructions on treatment of fast acid colors are followed.

Fourth.—The acid colors are so little known to the garment dyer that, as a general rule, they thought them applicable to new work only or mostly.

Fifth.—The few anilines they did use, as violet, fuchsine, green and Bismarck, smutted or rubbed off if dyed heavy.

This prejudiced them against anilines, and the fact that the above colors faded easily, helped to increase this feeling, and this objection certainly was well founded, and not at all confined to the garment dyer.

Everything has its use. Even this objection is no exception, as the chemists set to work to produce a new class of dyes that would not rub, and that would bear exposure, be as bright as the former, stand careful washing, and be cheaper in use.

All these conditions have been accomplished, and, to such an extent, that some of them will stand alkali, acid, sun and air as well as any of the old colors, and much better than some.

Sixth.—Manufacturers have found out the facts of all I have stated and are generally, yea, universally, adopting them with perfect satisfaction. I do not mean those who mix seventy per cent. cotton with thirty per cent. wool and tear it up together to make it into one soft thread to make all wool (?) blankets; or put it to fill up backs of all wool (?) heavy goods and dye the same with bright cotton colors just stuck with alum, that even rain will wash out. There is so much of this carried on in America that it is time a law was passed to prohibit it; and those who violated it ought to have a tag put around their necks stating their crime and put them in a public place till the Day of Judgment or until they made restitution and engaged to call "a spade a spade."

Such persons I know, and have seen in their mills labels with actual *fac similes* of European celebrated manufacturers of all pure wool goods, and theirs were being put on as their importations. I asked how this came about, and received the answer that the wholesale house for whom they made it supplied the labels and requested them to put them on. Shame on the manufacturer! Shame on the wholesale house! Shame on the retailer or jobber! As they all know the "dodge." England never would have built up her export trade, and could not now maintain it if she lent herself to such tricks.

I have done all I could to encourage domestic manufacture and will still do so; but I have no charity (if I have, it is a very *red-hot sort*) for frauds of this kind. Domestic industry, in the long run, is not helped but retarded by the few who do such dishonest trade, as even the McKinley Bill will not prevent the introduction of foreign goods unless as good is made here.

Please pardon this digression, and allow me to give one deep, long sigh in parting with those "hounds" that I cannot "metaphorically" give them a fatally twisted neck.

I will then proceed to my sixth reason for confining myself to these fast acid colors.

My sixth reason is, if they are so good for all departments of new goods they ought to bring some sunshine by way of desirable help to the garment dyer. I know it is hard to get garment dyers to change off from what they have been brought up to. One reason is, they do not get much time for experimenting, and they cannot take everyone's word. I don't blame them for this, as some of the big houses represent things falsely. The German, especially, is very hard to turn; he is a jolly, good-natured fellow, but you cannot stuff him much. When a boy, I saw the head of a goose held up and beans dropped in its throat; they just stuck there—then a stick forced them down. I said, "What do you do that for?" The answer was, "Want to fatten them and they won't take them any other way." All right; now I have got some beans and I want to fatten the garment dyer, so look out, you have to take them. As they sugar-coat pills to make them pleasant, so you see I have coated my beans with six good reasons and will yet add another.

Seventh.—What would have been the use of filling this book with the old way of doing things? All of the old people would have said, with a knowing wink, "He copied that from our great grandfathers." And the young men would say, "Why, he has been asleep for ten years or more." My father was in the business before me. I succeeded him and built a house and factory in the west of England, which is one of the best businesses anywhere about there at this day. I followed it for twenty years, and then sold out, and have devoted the last fifteen years to the study and development of mordants, colors and

machinery for the perfecting of the art. I call it an "art" as distinct from a trade, as the latter you can be taught and followed mechanically; the other is never learnt, but is always developing into something of present value and of future hope.

I am one of those who believe largely in the possibilities. Not that sort of possibility of getting knowledge without application, for nothing good is born but of pain; nor of getting rich without working for it. There are only three ways of getting money: 1st. Have it left you. 2d. Work for it. 3d. Steal it by fair means or foul.

I did not have it left me, I did not like to steal, so I settled down to work. Fitted up a laboratory and gave about three years to the investigation of the aniline colors, fixing them and making one-dip dyes. I must have been successful, for I was the first to do this in every midshade or compound color or one-dip vegetable dye, with one exception, that of one-dip wool vegetable black—that was a French invention, or, to be more exact, I was first told of it by a Frenchman. All others were, and are to-day, only following me. Am satisfied with variety and practical utility of my inventions, and, without egotism, I simply claim to be the father of these children. I do not look upon it either as good luck; for, like some pleasant fairy vision, they did not come in my way. I had to do a lot of comparative waste work for every tangible good result. When this was done and became known, as it did, I could get my $80 from a paper for an article, and had more communications than I could answer. I had to settle down and write the Am. P. Dyers' Comp., as already referred to, to satisfy progressive people the world over. I had then to put machinery in factory to manufacture my inventions.

Then came the experience of many inventors. Analyses were made, and lots of others commenced to manufacture.

Through failing health I sold out, went to old country, after a time came back and commenced my old business again as dry cleaner and garment dyer.

The cleaning is done on the premises here, under my superintendence. The dyeing is done away by those who follow my instructions, and the colors here recommended are used. So, I think, if anyone is entitled to the confidence of his readers in recommending what is to their interest to adopt, I shall be judged as being that man.

This work will, therefore, be seen to be the condensed experience of thirty-five years into one small book, containing all the information the garment dyer requires.

I do not question the good qualities of lots of drugs, especially archil and indigo. They have done and still are doing good service. The two mentioned cannot be beaten by any of the anilines except as to cost, and, as money counts, the anilines are there. Just a few lines, not to those who know me, but to those who do not. Please send me your trial order, and follow my instructions, and if the goods do not give satisfaction you can return them at my cost, and I will refund your money.

A word to my old friends. Since my return from the old country, I found that some of my patrons had written several times to my old address in Brooklyn. These letters never reached me, or they would have been answered. I have had no time to give them all my present address, and hope this means will find them, and I shall be glad to hear from them again.

INFORMATION ON ANILINE COLORS.

I will give advice to all the subscribers to this book, or to all who buy aniline colors from me. How to produce all midshades or mixed colors on any material of animal or vegetable fibre, in neutral

colors for mixed goods, of cotton and wool, and acid fast colors for silk and wool, in every shade. Send stamped directed envelopes, or no notice will be taken.

Will send quotations for any color needed (mention how much is bought at one time).

I will send pattern card of all the compound colors mentioned in book for fast acid colors on wool and silks from page 119, being forty shades, on receipt of 25 cents in stamps, and will send pattern book of ninety-six colors, in most of the desirable shades, dyed by me, on woolen yarn, all cotton and cotton and wool mixed yarns, showing fair samples of one-dip colors. The copies of this book cost 75 cents each. Some of them are slightly soiled on outside only. These I will sell at 25 cents each; perfect ones, 75 cents each.

FELT, FUR AND WOOL HAT DYEING.

REMARKS ON DYEING FELTS.

Felt-dyeing is essentially the same as wool-dyeing, though in practice certain modifications are rendered necessary by reason of the different nature of the hairs of the rabbit, the camel and the beaver, which are finer and smoother than wool, and consequently assimilate mordants and coloring matter less easily. Nevertheless, the mordants must not be too energetic as the felt would otherwise lose its natural lustre and its solidity would be greatly affected. This condition requires that the dye-beck should be kept at a well-regulated temperature, lest the solidity and the brilliancy of the shades should be impaired. For reds, felts are generally dyed with cochineal or red woods, but the preference is given to cochineal as yielding shades finer and more durable. The process is concluded with sanders or Brazil-wood, according to shade.

The use of bichromate of potash offers certain advantages in dyeing felts brown. The felt is boiled gently in a solution of this salt mixed with argol and sulphuric acid. The process is completed in a new beck containing fustic, sanders and Brazil-wood. Bichromate of potash alone gives fine brown reds on dyeing up in sanders.

BLACK FOR ONE HUNDRED FELT HATS.

First bath of fifty-six gallons water at 100° F., add one and three-fourths pints of extract of chestnuts and eighteen ounces soda and heat for three-quarters of an hour, but do not boil. Take out the hats and turn them inside out and put them back into the liquor for half an hour, then take them up and let them air half an hour.

Second bath of boiling water, dissolve dry extract logwood, six and one-fourth pounds; verdigris, two one-fourth pounds; copperas, eight and three-fourths pounds; extract dry fustic, seven ounces. When all are dissolved take three parts of it out and fill into the bath the same quantity of water. When at 100° F., the hats are turned right side out and entered for one hour. The heat is not allowed to exceed 130° F.; it is then raised to the boil, the hats receiving two turns and then left in for one hour, at which time they are taken out and aired. Cool the bath and put in half of the reserved liquor. They are now entered and turned every half hour for two hours, when the rest of the reserve liquor is added and the bath raised to the boil for a short time. They are then taken out and aired. When cold, wash the thin ones in cold and the thick ones in hot water. They will then be passed through an acid bath of seventy grains (two and forty-five one hundredth ounces) of muriatic acid to every gallon of water, to remove every excess of copper.

The object of starting with weak liquors is to prevent hardness before the dye has penetrated. The proportions given are for medium quality; best felts require less than poor felts, as they are more porous. For hard hats the soda will be omitted. If very deep shades are wanted, let them lay in the last bath dye till cold; if blue shade is required, leave out the fustic.

MAROON ON ONE HUNDRED FELT HATS.

Dissolve one and one-half pounds carbonate of soda in sufficient water to soak the hats, in which an extra pound of carbonate of soda is sprinkled as the operation proceeds. This hot bath neutralizes any acid in them.

Second bath, dry, extra fustic, three and one-quarter pounds; ground bark, eighteen ounces; extra dry madder, eighteen ounces; copperas, three and one-quarter pounds; verdigris, ten and one-half ounces.

The other ingredients should be boiled before the copperas and verdigris are added. Then add nine pounds blue archil.

Before dying, take out four pails of liquor and fill up with cold water. Enter at 112° F. They get two dippings inside and two outside; then raise the heat gradually to the boil; then take out as many only as can be opened before they get cold, for they will oxidize if left lie in heaps. The balance of the dye should be put in at each turn of the hats.

If not bright enough, add more archil; then wash, first in cold, then wth hot water; raise with acid if too dark.

GREEN.

Felts are dyed green more easily than blue. A green is produced by means of extract of indigo, or by prussiate of potash. The extract of indigo is

dissolved, then boiled for ninety minutes with alum and tartar. The felts are lifted, and a larger or smaller quantity of flavine is put in the same beck, according to the tone of green desired. The goods are then boiled together for about an hour. The flavine may be replaced by a decoction of bark or fustic. All shades of green may thus be obtained, by adding to the dye-beck, in the needful proportions, extract of indigo and a yellow coloring matter.

TO PRODUCE A PRUSSIATE GREEN.

The felts are first dyed blue, as previously directed for green, then rinsed and plunged into a solution of nitrate of lead and tartaric acid, in which they are boiled for about two hours. The dying is completed in a fresh beck, made up of red chromate of potash and a small quantity of nitric acid, which is heated until the required shade is produced. The proportion of chromate of potash to be used on the shade required.

BROWNS

may be produced in a variety of ways, but sanders and Brazil, with galls and sumac, are most commonly used.

For fawn shades, the goods are boiled in a beck of sanders and fustic in the proportion of three to two.

DEEPER SHADES

are produced by mixing with this beck a weak solution of copperas, and steeping the felts for fifteen or twenty minutes.

The deepest browns, and even blacks, may be produced by varying the proportions of sanders and fustic. The felts may be previously boiled in a solution of alum, argol, and a little bluestone, adding a

decoction of fustic, and boiling the felts gently in this beck for two hours. They are then lifted, let cool, and drained for twenty-four hours. It is best to rinse in the washing machine and finish in a decoction of Brazil-wood, one part; logwood chips, four parts.

DARK BROWN ON FELT—TWENTY-FIVE POUNDS.

Chromate of potash, seventeen and one-half ounces; oil of vitriol, three and one-quarter pounds. Boil for thirty minutes; lift, and add extract of logwood, four pounds six ounces; acid Bismarck brown, eight and three-quarters ounces. Boil for one hour, lift, and air.

YELLOW

of all shades presents no difficulty. The felts are boiled in a mixture of alum, tartar and a solution of tin, and then rinsed and dyed off in a flavine beck. We may obtain another yellow in a beck of alum and tin with a decoction of fustic, but the shades are too pale for most purposes.

BRONZE, ALL SHADES,

as well as other colors, are now dyed in one dip by my special aniline, prepared for this kind of work.

SILVER GRAYS

are obtained by boiling for half an hour in a solution of tartar, gallnuts and extract of indigo, saddening afterwards, more or less, with copperas.

COMMON GRAYS

are obtained by increasing the proportions of gall and copperas. For yellowish or reddish grays fustic or archil should be added.

A GOOD BLACK

is obtained by chromate of potash, two pounds three ounces; red argol, one pound; sulphuric acid, two ounces. When it has boiled well the felts are entered, turned and boiled gently for two hours; then in a bath of five pints fustic, twenty-one logwood, to shade.

RED.

The process of different reds is carried on as follows: A beck is filled with water, a solution of tin added, and the whole heated to a boil. The felts are then steeped in this for half an hour; then taken out and the requisite quantity of finely-ground cochineal, with a suitable dose of flavine, put in. The mixture is allowed to boil well, and the felts are re-entered and boiled gently and steadily. Lastly, they are washed. By working in this manner a fine scarlet is produced, and time, labor and fuel is economized. For bluer shades, leave out flavine.

CERISE.

For a cerise tone the felts are boiled gently for two hours in a solution of tartar, tin and sulphuric acid, and the dyeing is effected in a cochineal beck as above. Rose shades may be dyed in an old beck which has served for scarlet or cerise, adding, according as a lighter or fuller shade is required, more or less of tartar, solution of tin or cochineal.

ROSE.

A finer rose may be also produced by the use of alum and the finest quantity of tartar, and giving the color with ammoniacle cochineal. It will be understood, to succeed with the reds just mentioned, it is necessary that the felts should be washed and bleached. For the lighter shades yellow, red and flame color, garnet, orange and gold, the becks may be used which have served for scarlet or cerise, by adding a little young fustic and cochineal mixed with a solution of tin. These colors are rarely applied to felt, and we only mention them in passing.

REDS.

The shades obtained with red woods are very beautiful, but little used in felt dyeing, on account of their want of solidity. To obtain full reds of the woods, the felts are boiled in alum, free from iron, to which a little bluestone has been added, rinsed and entered in a decoction of Brazil-wood. Magenta may be used for topping.

BLUE

should be very fine quality to be suitable for felts. It may be produced with a red prussiate, along with tin crystals and oxalic acid, to which is added, in a wooden beck containing pure water, a very little sulphuric acid. The felts are then plunged in and energetically agitated in the beck. They dye up first a light green, then a deep green, then a bluish shade, which changes gradually to a deep blue, when the felt no longer must be touched.

During the latter part of the process, which lasts about an hour, the temperature is gradually raised. As soon as the goods have taken a deep blue, the beck is brought to a boil, and kept gently boiling

without interruption for another hour. At the end of this time a fine blue is obtained.

According to the tone desired, either magenta or methyl blue, may be mixed with water. For dyeing felts an aniline blue, the same methods may be followed, as for wool.

Indigo carmine is very seldom used for dyeing felts blue. If it has to be employed, they are boiled for a quarter of an hour with alum and tartar, and dyed aftewards in the same beck with successive additions of dissolved extract of indigo.

Felt, fur, etc., have thus been treated as the standard methods adopted for a number of years, and is being followed largely to-day. Many, however, have gradually shifted their moorings, and have gradually introduced the quicker and less expensive method of aniline colors, as also of alizarine colors, both of which I will now treat upon.

ANILINE COLORS.

For felt, fur and wool hats.

Black, being the principal color in demand, will have priority. Aniline salts, or oil, has been used successfully, but as this requires about as much operation as the foregoing processes, it would be simply futile to give the formula here, especially as a straight black aniline is now made brilliant fast black that will work with simply 2 per cent. sulphuric acid and 10 per cent. Glauber salts to 4 per cent. of color. Entered at 150° F., and gradually brought to the boil, from 4 to 6 per cent. will color one hundred pounds of hats, as good black as can possibly be dyed with any process; the results are always certain and really beautiful, and by far cleaner than by any other method, and stand fulling and pouncing splendidly. Four per cent. will color hats wool, 6 per cent. felt and fur. This color penetrates very well, and will exhaust or take up

clear; can be used for other lots, or other colors can be dyed in the same kettle, as per instruction on wool dyeing eight different colors from one liquor. See wool dyeing.

For further particulars of this black and price, see advertisement at end of book.

No one who tries this ever wants any other process, as it is in every respect a perfect boon.

In reference to other colors, what may be said of one can be said of all, which is this—there is no color or shade but can be obtained with very little practice, but will equal, if not surpass, any of the old methods, and at less cost in much less time.

I will mention a few as a criterion for the rest.

FELT-HAT COLORING.

Cost of dyeing with anilines as against old methods.

BLACK.

Brilliant fast black stands unrivaled, as one pound will color twenty-five pounds of dark stock; and one and one-half pounds will color twenty-five pounds of white stock.

FAWN, TAN, DRAB, ETC.

One pound color will dye about one hundred pounds. Price of color, $1.00.

DOVE COLOR, PEARL, SILVER GRAY, ETC.

One pound will color one hundred pounds full shades, and in light shade even two to three hundred pounds. Price of color, $0.75.

DARK DRAB AND LIGHT SHADES OF BROWN.

One pound will color one hundred pounds. Price of color, $1.00.

CANARY OR LEMON COLOR.

One pound will color from fifty to seventy-five pounds. Price of color, $1.00.

YELLOW OR FLAVINE COLOR.

Strong yellow, which is four times as strong as some yellows on the market, and intensely bright, will color from one hundred to two hundred pounds. Price of color, $1.00.

ORANGE, EITHER YELLOW OR RED SHADE.

Will color fully one hundred pounds. Price, $0.50.

SCARLETS.

All shades are the same price and strength, are equally bright as cardinal, and much cheaper. Price, per pound, $0.50.

GOLDEN AND ALL OTHER SHADES OF LIGHT AND MEDIUM BROWNS.

From one to one and one-half pounds will color one hundred pounds. Price of color, $1.00.

LIGHT SEAL BROWN.

One and one-half pounds will color fifty pounds full shade. Price of color, $1.00.

FULL SEAL BROWN.

One pound will color from twenty-five to thirty pounds. Price of color, $1.00.
Red or yellow shades, same price.

OLIVES AND BRONZE MODES.

One pound will color from thirty to fifty pounds. Price of color, $1.00.

MODE GREENS, ALL SHADES.

One pound will color from twenty-five to thirty-five pounds. Price of color, $1.25.

BOTTLE AND DARK GREENS.

One pound will color about twenty-five pounds. Price of color, $1.25.

LIGHT BLUE IN ALL TONES.

One pound will color about two hundred pounds, or, if very light, as much as four hundred pounds. Price of color, $1.50.

MEDIUM AND NAVY BLUE.

In greenish or reddish shade, or pure blue, are all one price. Price of color, $1.50.

CARDINAL.

Have a new color, which dyes equal to cochineal, very bright, and even far better than fast red or rocceline; indeed, it stands unequalled for its strength and brilliancy of tone. One pound will color about seventy-five pounds. Price of color, $0.75.

MAROON.

A good solid color is produced by this of desirable shade, that stands far better than any made from woods, archil, etc. One pound will color fifty pounds or over. Price of color, per pound, $1.00.

GARNET AND MULBERRY.

Two good shades; will color about fifty pounds each. Price of color, per pound, $1.00.

PLUM COLOR.

This is a new straight color, very strong and will dye evenly, as light as heliotrope and all the way down to a rich blooming plum color. Is quite fast. Price of color, per pound, $1.50.

Mode colors are mostly compounds; that is, two or more colors are blended into one. This is all explained and the proportions given for each and all in the articles on color mixing.

Those there given in acid colors are to be preferred to the neutral colors, as being much faster.

All the formulas given for the straight and compound colors of wool, will also do for felt, fur and wool.

And the same remarks apply to hat dyeing. That any particular shade of sample sent can be matched and the color sent with instructions.

Modifications can be made to formulas given and any anilines; that is to say, acid or neutral ones in connection with woods and other drugs if so desired can be used by first giving the following mordant:—

TO MORDANT FELT, FUR AND WOOL HATS SO THEY WILL TAKE ANY DYESTUFFS.

Prepare a bath with two pounds bichromate of potash, two pounds bluestone or sulphate of copper (which is both the same thing), three pounds argols and from three to four pounds sulphuric acid. Boil in this from one to two hours according to thickness of hats. From this no wash off is given; simply drain.

In the bath used for dyeing no acid must be used with the neutral colors or with woods.

ALIZARINE COLORS IN FELT, FUR AND WOOL HAT DYEING.

Alizarine colors may all be dyed on wool from the liquid or powder after mordanting, as follows:—

To one hundred pounds of hats, for alizarine red and S. B. in powder, prepare in bath five pounds sulphate of alumina, neutralized with a little soda and two pounds acetic acid 90° F.; enter goods just under boiling point and keep them at that for one and one-quarter hours.

DYEING.

Three to four pounds of color and two pounds acetic acid; enter cold and gradually raise temperature to the boil, and boil one hour and a half.

The mordanting and color can be done in one bath if a little duller color will suit. All bright shades of red and orange are brightest with this mordant.

ALIZARINE MORDANT FOR DARK SHADES.

The same mordant does for all dark colors in alizarine, namely: From two and one-half to three pounds bichromate of potash, one and one-half pounds tartar or one-half pound tartaric acid. Boil in this for one and one-half hours.

No goods are washed from the mordants, but are kept from air and sun as much as possible.

All colors and shades can be got from alizarine, as one color will mix and work with the other. The only skill is in mixing proportions to shade and seeing that the heat is not raised too quickly, or it will take on unevenly. And, if the color is taken up before the one and one-half hours have expired, the goods must boil in that time to even them and fix a firm color.

Dry alizarine is about 90 cents per pound. It will therefore be seen that it is much more expensive than anilines, without any corresponding advantage.

RE-DYEING AND FINISHING CRAPE VEILS.

They can be cleaned and dyed in one bath, by adding to the soap bath logwood and a little blue-stone, just enough to turn the logwood bluish. When black enough, well wash off. Then stiffen with glue, into which a little logwood is added to color the glue, so it will not look shiny.

Well wring out, then lay in dark linen cloth and roll up, and pat it all over; this will take all the excess of dampness out so no shiny places can appear.

Now put it on a frame, stretching it to the same size it was before; when dry, fold it down the centre, and put thin cloth or piece of paper over and press it over, just heavy enough to make it lay flat.

SECOND WAY.

Take it from the glue liquor, and finish it on the cylinder, taking care to fix it to size.

THIRD WAY.

Pin it out on sheet, or on a board, carefully smoothing all pin marks out after.

FOURTH WAY.

After they are strained and dry, some put them in the press without heavy pressure; in this case, they have to be changed like a shawl to get the edges that lie outside the press pass inside with another press.

SPOT-REMOVER.

This spot liquor should be in use by every cleaner, as it will do more for them than all other things put together.

Spot-liquor formulæ will here be given for the use of those who purchase this book, and for their use only, as no one will be permitted to make it for sale, or for presents to others, as the proprietor reserves all rights to himself, which are protected. As it is put up in one-gallon jars at $2, half-gallon jars at $1, one quart at 50 cents, safely packed and delivered to express office at that price to the trade, or in three-dozen-bottle cases, of the price named on label, which label is on every jar and bottle, this case will be sold to the trade at one-half price, so they can retail it without interfering with their business, as customers are likely to use it only on small jobs the cleaner would be as well without. And a good bit may be made by its sale. For those who do not wish to make it themselves, the one-gallon jar will be likely to last them the season.

TO MAKE ONE-QUART SPOT-REMOVER.

Take one-half ounce each of glycerine, alcohol and sulphuric ether and pure oil soap, with two ounces aqua ammonia, with one quart of distilled water. Agitate the whole from day to day until the whole is one aqueous liquid, with the soap fully dissolved. In many cases the cleaner will find that one part spot-remover and four parts water will be quite strong enough, so that it is an exceedingly cheap as well as useful article to have by one.

Since the preliminary announcement that this book was about to be published I have had inquiries on all hands to know if a good cotton black will be there, showing that such a thing is needed.

Up to the time of going to press a good, cheap aniline black has not transpired; failing to find such, just as soon as I get the time, after getting a rest from the publication of this book, I will turn my attention to a method of fixing my brilliant wool black on cotton. If I can get as good color on cotton as it does on wool I shall be pleased to make it known to my friends. Till then I can only refer them to the formula given for one-dip vegetable cotton black, that will produce a good color on cotton or mixed goods, but requires a lot of washing off to clean it.

The fast cotton black on my list at $1.75 per pound is too expensive for the garment dyer on his ordinary work, but if he has absolutely fast blacks to dye on cotton goods he must charge such a price that will pay. I will here give two formulas for it. The price one firm, who is doing this work in this city, asked for the formula was $350, and they would take no less; neither of the others would sell it at any price, so the purchaser of this book will get it cheap.

ABSOLUTELY FAST COTTON BLACK FOR ONE HUNDRED POUNDS.

Prepare a bath of five pounds each carbonate of potash and common salt and five pounds benzo black; enter yarn and boil one hour; lift, wash and wring.

Prepare second bath of thirty pounds extract of sumac; boil one hour; lift, cool and wring.

Prepare third bath of twelve pounds nitrate of iron; enter cold, give four turns; lift and wring. It does not say wash off. I think this must be an omission.

Add fifteen pounds more extract sumac to second bath; enter, give six turns at the boil; lift, wring and return to third bath cold, give four turns, wring and soften in a fresh bath at 130° F. of ten pounds turkey red oil, wring and dry.

For all succeeding lots use only one-half the quantity of carbonate of soda and salt, and three and one-half pounds benzo black. It is said fresh sumac must be used every time. I should think that if it was washed from the iron baths, the same would do with one-half the quantities added, as the iron must kill the sumac.—*Textile Colorist*, April, 1889.

SECOND PLAN.

ANOTHER FORMULA FOR BENZO BLACK, ONE HUNDRED POUND GOODS.

For Blue Black.—Prepare a bath of four pounds carbonate of potash, two pounds oil soap, three and one-half pounds color; enter goods at the boil, and boil one hour, then wash off thoroughly.

For Jet Black.—Pass the above through a cold bath of six pounds nitrate of iron and twenty-five pounds sumac.

THIRD PLAN.

After the dye bath pass into bath of cold water, into which six pounds nitrate of iron has been added, let lie in this for one and one-half hours, giving a turn now and then; well wash off. Then make a bath of twenty-five pounds best sumac, let lie in this all night, lift in the morning, and handle again in the same iron liquor. Then, without rinsing, enter again the same sumac bath, give several turns and well wash off.

A deeper black still is gotten by adding some extract of fustic to the first sumac bath.

Remarks.—The second plan given would be rather expensive to the garment dyer, but if the same can be borne for fine work, it will look well, as benzo black does not take on wool.

Cotton in wool goods can be filled up a navy blue by only using the first bath of the second formula, leaving out the iron and sumac.

DYEING SILK BLACK WITH ANILINE.

NEW METHOD, PATENTED BY

FRIEDR. BAYER & CO., ELBERFELD.

One Hundred Pounds Silk.—Prepare a bath with ten pounds Glauber salts, one and one-half pounds diamond black and one and one-half pounds diamond green. It does not say what heat. I therefore infer good hand heat; as hot as can be borne is best till the color is taken up.

Then prepare a bath of bichromate of potash two pounds; enter at boiling and turn for one-half hour.

FOR BLUE BLACK.

Use three pounds diamond black and no green.

FOR GREEN BLACK.

Use diamond green and no diamond black.

THINGS WORTH KNOWING.

To Cure Chrome Goods Over-mordanted.—After too much chrome is in woolen goods they will not come black. To cure this, add small quantity of chromate of potash to the logwood and bath and re-enter goods.

To Cure Button-holes, White Threads, etc., on Dyed Goods.—Dip the end of a match in ink and go over till they are a good color. Do this after pressing; your damper will not then get stained.

To Improve Dyed Black Velvets and Velveteen.—Often, when dyed or re-dyed, they have a poor, hungry look. To remove this, when they are finished give them a good brush down with benzine of 65 gravity, this has less gas but more oil than the higher grade. It is a good dressing and cures that hungry look. Sweet oil is used by some, but lints and dust will stick after it and in time turns offensive. Benzine has only a good effect.

To Prepare Wool or Woolen Goods so they will Dye in the Sweet or Neutral Colors and be Perfectly Fast.—A most valuable recipe.—Neutral colors to stand fulling, etc.: For one hundred pounds of goods, prepare with eight pounds spirits of salts, eight pounds hyposulphate of soda, at 180° F. for one hour. Drain, but not wash. Then enter bath of four ounces of aqua ammonia cold, well open, then drain; no need to wash. Then dye in the usual manner with Victoria blue, fuchsine, green crystal, Bismarck or neutral brown and violet. None of them will crack after this preparation. It will fix all the mixed neutral colors just the same.

Bleaching with sulphur has already been given. For those who have no sulphur-house I give the following process:—

To Bleach White Goods without Sulphur.—For twenty-two pounds wool or woolen goods: To a beck of sufficient size to handle in, three parts fill with water, add four and one-half pounds spirits of salts, and eleven pounds bisulphate of soda. This creates a sulphurous acid when well stirred up; into this enter the goods and open well; some let remain in for six hours, but less time will do. Tint it with indigo and 6 B violet which has been dissolved and well strained through flannel. This is a good imitation of the sulphur process, with this advantage, it has no disagreeable odor, and there is no fear of injury. The same bath will do for other lots by adding to it, each lot.

KID-GLOVE DYEING.

See that all holes are stopped up, then fix the tops by using a thin gum or white of an egg. This will stick them closed so the dye does not get into them. Boil one pound logwood in two quarts of water until it gets one quart. To this add a little oil soap, and when blood heat brush it over. Hang up to dry and go on with the others; when through commence again, and repeat till black; when dry, brush over with black pyrolignite of iron or chrome. When dry open them, and dress them with beeswax or oil very lightly, then rub clean with soft cloths till nothing comes off. There are many other ways of doing them, but the best way is to send them out and get them done by regular glove dyers. They can be done at 15 cents a pair, you pay mailing one way and they back. If you have no one to do them I will recommend A. D. Eyre & Co., Jersey City Heights, N. J. They have done mine for some time past with perfect satisfaction. See advertisement.

FINISHING COMPOUNDS.

It is well known that silks, when washed, are not nearly so stout and full as before, but the cause is not well known. It lies here—new silks gets stuffed.

First.—It is dyed, or, if white, finished off in cleaning in a soap bath.

Second.—White and all light goods are given a compound of glycerine, sugar, and gum. This gives the fulness without the rattle. Equal parts of each may be used and the same fulness restored. As this compound is transparent, it can be used for any color. Gum alone makes it too stiff, but sugar makes it less so; the glycerine perfects it, as that always keeps supple. Gum alone is preferable to glue, as this is too brittle and easily creases. Dextrine is also superior to glue, as it will give more body and yet be softer. As this has some color, is does not do so well for light shades as first compound. Linseed meal, boiled and strained, gives a good body and is soft.

TO IMPROVE BLACK SILKS OVER-DYED.

First.—Give them a weak sour in warm water.

Second.—Beat up sweet oil in soda liquor until it becomes a white liquor, then add a little oil soap and wash through at a hand heat; squeeze out, but not wring.

Third.—Fresh milk in warm water will produce good effects; about one pint milk to four warm water; it will also stiffen it at the same time. Cotton, or cotton and mixed goods, over-dyed, comes up good this way.

See also starch process for finishing.

TEST FOR SOAP.

Twenty parts are dissolved in water, and then mixed with five parts of diluted sulphuric acid.

The fat will then rise to the top, and the mineral impurities fall to the bottom. In this way the most flagrant adulterations can be detected.

FINEST ELASTIC STARCH.

You can buy it or make it as follows: Melt one pound stearine, and when cold powder it, and mix with fifteen pounds of starch.

BERLIN BRILLIANT DRESSING STARCH.

Mix from two to two and a half pounds of borax with one hundred pounds of starch made from wheat.

TO EXTRACT PAINT AND TAR.

Benzoline is no doubt as good a solvent as can be found. If woolen goods, moisten the spot, then rub, and moisten and rub again until out. For silk, lay it on a tea tray and sponge it out, or use a hand brush. If there is much on the garment, it may first be plastered over with fresh butter or lard to soften it. Spirits of wine, or methylated spirits, is used by some in lieu of benzoline. Pure naphtha, or benzine, is the same thing as benzoline.

TO EXTRACT WAX TALLOW SPOTS.

Dip in benzoline, and rub them, and they will quickly disappear. Alcohol may be used instead of benzoline.

SCORCHING

white goods. Rub well with linen rags dipped in chlorine water. Colored cottons, re-dye, if possible, or in woolens raise a fresh surface. Silks, no remedy.

TO REMOVE NITRATE OF SILVER STAINS

from woolen or linen cloths of any kind. Iodine, one drachm; iodide of potassium, one ounce, mix. Dab the stains with the above mixture, and in about half a minute wash with one ounce of cyanide of potassium, in five gallons of water.

SURE TEST FOR ARCHIL.

The best re-agent for the detection of aniline red is picric acid, in extract of archil diluted with water. It occasions no precipitate, but, if aniline red has been added, it gives a strong brown precipitate, the picrate of rosaline. In this way very small percentages of aniline red or violet may be detected.

If the proportion is very small, the precipitate remains suspended for a long time, and the liquid appears almost clear by transmitted light. But by reflected light, the precipitate appears as a turbid brown, which does not subside for some days.

WATER TESTS.

As good results in cleaning, bleaching and dyeing depend so much upon the quality of the water employed, care should be taken before locating to fully test it.

The following tests may, therefore, be helpful:—

Test for Hard or Soft.—Dissolve a small quantity of good soap in alcohol. Let a few drops fall into a glass of the water. If it turns milky, it is hard; if not, it is soft.

Test for Earthy Matters or Alkali.—Take litmus paper, dipped in vinegar, and if on immersion the paper returns to its blue shade, the water contains earthy matter or alkali. If a few drops of syrup of violets be added to a water containing an earthy matter, it will turn green.

Test for Carbonic Acid.—Take equal parts of water and clear lime-water. If combined, or free carbonic acid is present, a precipitate is seen, to which, if a few drops of muriatic acid be added, an effervescence commences.

Test for Iron.—Boil a little nutgall and add it to the water; if it turns gray or slate-black, iron is present.

Second.—Dissolve a little prussiate of potash, and, if iron is present, it will turn blue.

Test for Copper.—If present, it will turn a piece of bright polished steel a copper color.

Second.—A few drops of ammonia will turn it blue, if copper be present.

Test for Lead.—Take sulphurated gas water and equal quantity of water to be tested; if it contains lead, it will turn a blackish brown.

Second.—The same result will take place if sulphurate of ammonia be used.

Test for Sulphur.—In a bottle of water add a little quicksilver; cork it for six hours, and if it looks dark on the top, and on shaking looks blackish, it proves the presence of sulphur.

Test for Magnesia.—Boil the water to a twentieth part of its weight, and then drop a few grains of neutral carbonate of ammonia into a glass of it, and a few drops of phosphate of soda. If magnesia be present, it will fall to the bottom.

Test for Lime.—Into a glass of the water put two drops of oxalic acid, and blow upon it; if it gets milky, lime is present.

Test for Acid.—Take a piece of litmus paper; if it turns red, there must be acid. If it precipitates on adding lime-water, it is carbonic acid. If a blue sugar-paper is turned red, it is a mineral acid.

TO SOFTEN HARD WELL WATER.

Hard lime containing water for washing, bleaching and dyeing factories, is easiest made soft and free from lime by the addition of spirits of sal-ammoniac. For each one thousand litres (two hundred and sixty-four gallons) water take one-quarter litre (0.52 pint) spirits of sal-ammoniac of a strength of 0.960. Let the water settle over night, and next morning, by a faucet, drain off the clear water above the sediment.

An excellent water for dyeing, also, is obtained by passing steam through a vessel half filled with water, and heating it to 60° R. (167° F.). The carbonate of lime will deposit, in a short time, and a good water, pretty free from lime, is obtained by the use of the condensed steam.

WASTE OCCASIONED BY HARD WATER.

It has been found that one part of lime in soft soap, containing silicate of soda and starch, occasions the loss of 52.08; soft soap, containing 36.9 per cent. of water; neutral tallow curd soap, 19.80;

cocoa-nut oil soap, watered, 61.40; glue soap, containing glycerine, 24.48.

This shows that one-third cubic yards of ten degrees of hardness, or, what is the same thing, containing three and one-half ounces of lime, dissolved, will destroy eight pounds of soft and two and one-half pounds of dry curd soap.

PURIFICATION OF WATER.

It has been very aptly said a child may ask a question that would puzzle a philosopher to answer.

This is *apropos* to the question of the purification of water, as so many attempts have been made to solve this knotty question, so as to render it fit for dyeing purposes, with only partial success. I say partial, as the ingredients used for the purpose, even supposing that they gain the end they are used for, yet leave something of their own presence behind, so that at best it is getting rid of the larger for the lesser nuisance, which, no doubt, is something to be thankful for. I will, therefore, give my readers the benefit of the best-known plan for this purpose, and wait further developments, as—

> For every evil under the sun
> There is a remedy, or there is none.
> If there's one, try and find it,
> If not—never mind it.

The first is chloride of iron and milk of lime.

To prepare the chloride of iron take spirits of salts and add scrap iron as long as it dissolves without sediment, then pour off the clear liquor and use one-quarter pound of it to thirty-five cubic feet of the water or to about two hundred and ten gallons; then about twelve ounces of lime are added, which will make it clear and transparent. The cost of this process may be partly recovered by using any deposits formed as manure.

Use one-quarter pound green copperas in place of the above. It is not generally known, but green copperas is a most excellent disinfectant, with this additional advantage, that it has no offensive smell. Throw it into a cesspool, or other nuisance, and it will soon neutralize it; moreover, it is a very cheap as well as safe remedy. Alum may be used in place of either of the foregoing, or conjointly with the copperas. Alum, dissolved in proportion of one grain to one gallon water, if let stand some time, will make it quite clear, fit for white goods or drinking purposes.

Muriatic acid alone, will, in many cases, render good service in the proportion of two fluid ounces to one hundred gallons of water. Water that has been used at one factory and reaches the next, impure, even supposing it to have contained tannin or other dye washes, can be so treated by the above processes as to become quite usable. There is a more expensive process, namely, filtering all that is required. This may be done by several means, but, perhaps, the best is to erect dams and let the water flow over from one into the other. By this means it gets the opportunity to settle off much of its impurities, so that the last dam will be much cleaner than the first. Precaution must, of course, be taken in either case to remove all deposits as often as is required.

FIRE-PROOF BUILDINGS.

With ordinary care very few fires would occur, but the trouble is, you cannot get many employes to take just ordinary care, even though their own lives are in jeopardy by neglect thereof. Hence the necessity of providing buildings, especially for dry-cleaning and stove rooms, fireproof. It is well known that many buildings supposed to be fireproof proved

to be just the opposite. In most cases the cause of failure was in the iron pillars, etc., getting heated, and instead of their resisting they actually accumulated and then communicated the heat, as iron will get and retain the heat for a long time, even till it becomes so warped that it falls and brings the building down with it. And then, if not before, setting everything combustible on fire, and being covered up and thus protected from wind and water it still retains its heat and is the cause of after-outbreaks, when it was supposed the fire was out.

Good, hard lumber is, therefore, to be preferred, as in very serious fires it has been found that such lumber has been only charred, and could be used again by being scraped, and if it fell while burning, the falling is likely to stop its going any farther. If possible, it is desirable to have a brick building for dry cleaning, separate from other buildings—the insurance will be less and the danger to other property less. The hard wood, as already referred to, should be used, and for further protection any exposed parts can be covered with Portland cement, which will considerably protect from flames. The other parts, if painted with silicate paint, which is made of ground or dissolved glass, will afford much resistance. If only a lumber building is used, it should be built of prepared lumber as follows:— Make a lumber trough the size of the lumber to be used, in which make a preparation as follows:—

Sal-ammoniac, 15 parts,
Boric acid, 6 parts,
Borax, 3 parts,
Water, 100 parts.

Make enough of this to lay your lumber in. Place rods on bottom, lay lumber on rods, then rod again, the lumber, etc., till nearly full; then turn steam on

to the boil. Cover up and let boil for one hour, which will be time enough, for one-inch board, for superheated steam to penetrate it. When finished lay them as lumbermen do to dry; now go on with another lot, etc., till you have enough. The same liquor will do many times with the chemicals added to it each time. Wood so prepared positively will not flame, so a fire could easily be put out, if it did occur, without communicating to other parts. If a fire does occur, shut all doors so that the draught shall not fan the flame, throw sand, dirt, or ashes on; this will absorb benzine, oil or such things and so extinguish the flame. Don't pour water on, as that will not put it out but only scatter it, with the danger of setting other parts on fire.

The fault of the preparation is, if it gets wet it partly loses its property of being fireproof. To prevent this paint over with the silicate paint as before mentioned. It will then be waterproof and fireproof. If it is desired to use a lumber building already up, the hot solution can be applied several times with a brush, then when dry paint it.

FIRE-PROOF BUILDINGS.

Buildings used for dry cleaning should be of brick, with as little woodwork in them as possible, and separate some distance from other buildings, so that, in case of fire, less damage will be done.

Iron pillars, girders, etc., should be avoided, as it has been found that oak and other wood will stand more heat and resistance than iron, which gets red hot, doubles up, and the building collapses. In the case of wood it more often gets only charred than burnt through, therefore, supports the building from collapse, and often such woodwork can be used over again.

If exposed woodwork gets a casing of sand and cement plastered on, this affords very great resistance, and, apart from chemical preparations, is undoubtedly the best protection.

Silicate paint, being made from water glass, affords considerable resistance. It is applied like ordinary paint.

INCOMBUSTIBLE WOOD.

Few people want to build substantial stone or brick buildings upon other people's property. In such case lumber should be prepared as follows:—

In large wood tank to every one hundred parts of water add fifteen parts sal-ammoniac, six parts boracic acid, three parts borax. Bring on steam to a boil till dissolved, lay lumber in so the liquor can get to all parts of it, fix a cover over and get up all the heat you can for one-half hour at least. Then take out and lay it in dry place like a lumber merchant would for drying; use same proportions in next and following lots. Posts, etc., require longer preparation.

When dry you can put such prepared wood on a red-hot fire and prove that it will not flame. So it would never scatter or communicate to any other part of the building, as under the greatest heat it will only char and crumble away, but not flame.

The greatest drawback to it is, if it gets wet it partly washes out; to prevent this, paint it inside and out with the silicate paint; it will then be fire and waterproof.

If the lumber building is already up, good effects can be obtained by using the liquor described boiling hot with a whitewash brush, going over two or three times from each drying.

For drying rooms and lots of purposes the above formula is invaluable, and lessens insurance charges.

USEFUL COLORS FOR GARMENT DYERS.

Neutral or Sweet Colors.

Fuchsine Best Crystals.....$1 25
Chrysoidine, Y or R..... 0 75
Neutral Cardinal (darker and yellower than Fuchsine 1 15
Garnet (darker than Cardinal) 1 25
Bismarck (Red or Yellow) 0 75
Neutral Brown..... 1 10
Seal Brown..... 1 25
Brilliant Green (Neutral).. 1 25
Violet $1 50
Olive Green..... 1 25
Bronze Green..... 1 25
Plumb Color..... 1 50
Bright Blue (on green a red shade, will dye from 4 B to dark shade)..... 1 50
Navy Blue..... 1 50

All the above will dye on silk and wool.

Cotton must be mordanted.

FAST COLORS FOR SILK AND WOOL.

Fast Acid Colors.

Scarlet, any shade $0 50
Cardinal (has no equal)... 0 75
Canary Color..... .. 1 00
Strong Yellow..... ..... 0 75
Orange (any shade)..... 0 50
Wine Color..... 0 75
Mahogany and Terra-Cotta 0 75
Garnet 0 75
Green (fine shade)..... 1 25
Medium and Bottle Green.. 1 25
Olive and Bronze Green.... 1 00
Blue 4 B Shade..... .....$1 50
Navy (any shade)..... 1 50
Golden Brown (fine)..... 1 00

This is an extraordinary good thing, as it will dye a fine tan color, golden brown, medium brown, down to a full yellow shade of seal brown. Please try it.

All the above dye in an acid bath.

TO CLEAN COLORED FELT HATS

proceed in the same manner as for white, only use dry bran or naphtha, and holding the hat over the bowl, with a sponge keep going over it, allowing it to drip off back into the bowl. When clean take cloths and rub till dry. Then expose to sweeten.

TO CLEAN DARK OR BLACK FELTS OR SILK HATS,

well wash them with benzine, a sponge, or if very dirty, with a hard brush till clean, and wipe them dry with a colored cloth so as not to get lint into them. Hang them up for a time till the scent is gone.

TO CLEAN WHITE FELT HATS,

keep rubbing them with dry magnesia or plaster of paris. Some use flour or pipe clay. They are rubbed till quite clear, taking care to retain the shape. Then pat the dust out.

GOOD SCOURING SOAP.

Take fifty pounds of Greenbank pure caustic potash in an earthen or metal vessel with nine gallons of water (ninety pounds), stir it twice, it will then become quite hot; let it stand till cold. Place in another vessel twenty-two and one-half gallons of cotton-seed oil, pour the dissolved potash very slowly upon the oil, well stirring it all the time till they are perfectly combined, and in appearance like honey. Now cover it up and put it in a warm place till next day; then stir up again and let it stay three days, when it will be quite even. The result yielding about three hundred and forty-five pounds of very stiff potash soap, more concentrated than fig soap.

TO MAKE SOFT SOAP.

Take two hundred pounds of the above soap, add to it seven gallons (seventy pounds) water, put it into a pan and gently heat it up, stirring it all the time. When well-mixed add seven pounds of crystal carbonate of potash; this will remove all stringiness and produce a clear homogeneous soap.

The above cold process is both simple and effective; any one can make either small or large lot by it. It is in all respects far preferable for wool scouring than the ordinary soda soap, as the wool scoured by it will be both whiter and softer.

Linseed oil, tallow or grease can be used in part or entire in place of cotton-seed oil, if any of the

others are handier to get. One part of hemp-seed oil and one part of the cotton-seed oil will produce a color like olive oil soap. Potash, not soda, should be used both in making and using soaps for wool scouring.

WASHING CRYSTALS.

Many different preparations are sold under the above name, and a great deal is claimed for them. After giving a general outline of what they are composed of, I will then let the reader judge if they are of any value to him.

Virmmelbern's Wool-washing Composition.—Thirty-five parts of dried soda, ten parts of soap powder, ten parts of sal-ammoniac.

Ward's Wool Washer.—Ninety parts of effused soda crystal and ten parts of soap powder.

The Universal Washing Powder.—A water glass containing soda with a small percentage of tallow soap and starch.

Several, well advertised, are simply washing soda with from one to five per cent. of borax, while some even contain Glauber salts and others common salt.

CURTAIN CLEANING.

After they have been washed and limed in the wash-off water add just a few drops of sulphuric acid; this will set the chlorine free so that they will not have so much scent left in them. And in the starch add a little borax; this will give them a better finish and neutralize any acid that may be left in them.

TO STAIN CURTAINS BUFF, ECRU, ETC.

If buff is required, add very sparingly No. 4 orange and alum to the starch. For darker add boiled coffee, or No. 4 orange and Bismarck.

WONDERS OF ANILINE CHEMISTRY.

Aniline colors are manufactured by treating one or more of three substances, viz., benzole, anthracine and naphthaline, with salts of copper, salt and other chemicals and acids, under various conditions of pressure and temperature. The benzole, anthracine and naphthaline are obtained from the decomposition of coal tar in the following proportions: From one hundred pounds of coal tar there are derived, benzole two and one-half to three pounds, anthracine one-quarter to one-half pound, naphthaline six to eight pounds.

There are thus derived from each one hundred pounds of tar from nine to twelve pounds of products available for the purposes of aniline manufacture. Of these the most important is benzole, which is composed of twelve parts of carbon and six of hydrogen. It, therefore, offers the two fundamental elements in proportions which, when combined with other elements by chemical processes, produce a great variety of brilliant coloring matters and practically perfect substitutes for numerous organic materials of large commercial value.

Thus far in Europe the distillation of coal tar and the manufacture of aniline colors have not been combined by any one establishment. The manufacture of aniline materials from the tar is one branch of business; the production of colors from these materials is quite another. Aniline color-makers prefer the English benzole as being more rich and productive, although benzole is largely manufactured in France and Germany. The English product costs in London from $1 to $1.10 per gallon; that made on the Continent is somewhat cheaper.

From anthracine, the second product of coal tar, is manufactured alizarine, the substance which has almost entirely superseded madder and destroyed

the profitable culture and sale of that comparatively expensive vegetable dyestuff throughout the world.

From naphthaline is made the beautiful variety of light albo-carbon colors, so important in the repertory of modern dyestuffs.

There are now manufactured in the four large aniline color laboratories within the district of Basle, Switzerland, between forty and fifty different dyeing materials, which are variously used for coloring silks, cotton, leather and other substances, as well as for the manufacture of colored writing and printing inks. Many of these colors are readily soluble in water, and unite perfectly with the goods without the use of a mordant; others are soluble in alcohol or water impregnated with acids, and still others require the use of mordants to render the color clear and permanent. The strength of coloring capacity of some of these dyes is wonderful, a single grain or crystal of the solid pigment being enough to make a dye sufficient to color a large quantity of textile material. Another noticeable quality is the superior affinity of the aniline color for the fabric to be dyed. This is so positive that in many aniline dyes repeated immersions of silk, cotton, or wool take up the whole amount of color, leaving the water or spirit in which it was dissolved almost transparent and pure.

The value of the recently discovered indigo substitute will be apparent when it is remembered that while vegetable indigo costs at wholesale in Europe $3.20 per pound, this aniline substitute for it, which produces a scale of perfectly solid, permanent colors, can be created in exhaustless quantities and sold at a profit for 14 cents per pound. Even in India, where the culture of vegetable indigo has long been an important branch of agriculture, and in China and Japan, where the popular taste for color amounts to a passion, these aniline dyes are rapidly superseding all others, and a large proportion of the

colors manufactured in the district of Basle are sent directly to the remote East.

From the American standpoint the whole subject of aniline chemistry is undoubtedly of the highest interest and importance. Coal tar, as well as the fuel and other materials used in the distillation of benzole, anthracite and naphthaline from that substance, are all more cheap and abundant in the United States than in any part of Europe. The acids and chemicals required in producing aniline colors from the three products named may be somewhat more costly at home than abroad, but the high duties which are at present levied on imported aniline colors will far more than compensate for this slight disadvantage. It is simply a question of how soon American capitalists will see their opportunity, and by engaging practical and competent European chemists, establish this wonderful branch of manufacture on a large and profitable scale in our own country. In order to attain the best results the scope of a single firm should include the production of aniline materials from the tar, as well as the manufacture of colors from these materials by the methods already in use.

The production of benzole from the refuse of petroleum was discovered about three years ago by a professor of chemistry in the Polytechnic School at Zurich. His process consisted in passing the petroleum vapor over a surface of heated bricks or tiles; but just at the moment of success the overworked brain of the chemist became deranged, and in a fit of temporary madness he committed suicide, leaving the only knowledge of his discovery with a clever young student who had served as his assistant in the laboratory. The student resumed the experiments, attained what was regarded a practically successful result, patented the discovery in the United States, and has recently established a laboratory there with capital furnished from Basle, to

develop his process on a commercial scale. It is believed by those in the best position to know all the facts that the success of this enterprise is already demonstrated.

Within the past few months some notable discoveries have greatly enlarged the scope of aniline production. From benzole, as derived from petroleum, there are now produced, in experimental quantities, extracts of vanilla and cinnamon, which are chemically identical with the same extracts produced from natural vegetable materials. Not only this, but the German chemists have essayed to produce quinine by similar methods, and have already attained results that warrant their confident expectation of early and complete success.

There is now in process of organization in Central Europe a company with large capital to establish in the United States a manufactory of flavoring extracts and substitutes for various vegetable drugs from aniline materials.

The circumstances under which this information has been obtained preclude a more detailed allusion to the subject in this connection, but the mere statement of the fact should be sufficient to show the rapidly broadening field of aniline chemistry and indicate its future possible importance as a source of wealth in the United States. All these discoveries are of vast commercial value, and are, as a matter of course, carefully guarded.

The earliest fruits of such inventions will be inevitably harvested, even in the United States, by European capitalists and their chemists, who are so far in advance of their American competitors in this whole field of research; but it is contrary to the traditions of American enterprise that our country should remain permanently dependent upon foreigners for what can readily be manufactured at home. It is asserted, with what truth I am unable to judge, that in so far as the manufacture of aniline colors

has been attempted in the United States the result has been more or less unsatisfactory, the home-made dyes being inferior in quality to those imported from Europe. If this is true, the only cause for it must be want of experience and skill in the process of manufacture.—*Report of Consul Mason.*

The author can now add it is a pleasing fact that, after several defeats, some anilines are now made in this country equal to any imported.

THE SO-CALLED DRY DYEING WITH BENZINE.

Patented by Messrs. Armand & Berton.

Take oleic acid, stearic acid, margaric acid, or the acid used by the inventors, add the desired aniline dye, and shake the mixture until the aniline dye dissolves. According to the nature of the dissolved stuff, next add a certain quantity of volatile alkali, or a concentrated solution of soda or potash, or sulphuric ether, and pour the mixture into benzine, whereby most admirable colors are obtained. The same purpose may also be obtained in the following manner:—

The oleic acid and the dissolved color are poured into benzine, which has previously been saturated with volatile alkali, a solution of potash or soda, or sulphuric ether.

[The aniline factory of Berlin prepares aniline dyes only soluble in fats or oils, benzine, etc.]

MORDANTS AND DYE WARES.

Pity it is that so much confusion arises from the numerous names given to the same dye wares, and to the same shades of colors. Surely it is high time that some joint action was taken by the leading

technical schools to correct the mistake of having so many names to one thing, or one shade, or if there must be a plurality of names at least let them refer to the one thing or one shade. As it is, one may read a formula for cardinal, and unless it is accompanied with the shade it produces, it may mean anything from a ponceau to a claret. So much divergency of opinion exists, even in the United States that I often have to send and ask what shade is meant by the name employed. That some difficulty would be met in the task I am willing to grant, more especially in reference to the shades, yet that it is insurmountable I cannot accede to, as take blue for instance, which I here select because of its more numerous shades than perhaps any other color. Yet the difficulty could be gotten over by numbering the shades, so as to make a standard of reference, it may be from 1 to 100, or even to 1000 if the case required it, the same to be recognized at least in the same country, if practicable for every country. It would then be easy to say No. — in blue can be dyed by such and such means. Every one could then look and see if that was the shade he required. I believe the paint trade has a standard of colors.

Every one has not had the advantage of a chemical education who even against this disadvantage have by dint of perseverance made their mark; the fact being that a chemical knowledge was not considered essential to a dyer by the majority of the trade thirty years ago. It is quite true a man may make a good dyer without it, but the same man would have made a better one with it, and be saved many annoyances of trying this and that formula which, containing no true assimilation or agreement, therefore proved abortive. As it would also often save one the bother of finding out what a certain chemical means, as an example I will mention two cases. A formula called for half an ounce of hydrochloric

acid (the term often used in bleaching), the man went to his druggist and paid twenty cents for it, afterwards finding that he had plenty of it in his store, only called by the less pretentious names of muriatic acid or spirits of salts. The other called for a few drachms of muriate of soda. For this he had to pay fifteen cents, and afterwards was mortified to find it was only common salt. Thanks for the fact, chemistry is now appreciated as a help to dyeing, and those who avail themselves of it will be employed for their brain power, while those who do not will be employed for their machine power. Let any young man who may read my book remember that when house is gone and money spent then learning is most excellent. American young men would make good chemists if they only liked application better. Why is it that nearly all the chemists here are Germans? For the reason that the American boy loves play and going around better than reputation for practical study. If this state of things continues it will be very mortifying to find in a few years that the born American has allowed the strangers to fill all the best positions in the technical arts and sciences of his own native land. To be well warned should be to be well armed.

"Scarcely a European exchange comes to us," says an American textile journal, "in which we do not read of the wonderful results attained year after year, generation after generation, from the excellent technical schools, which are patronized by so many thousands of intelligent young men. Germany, particularly, seems destined to be Europe's industrial teacher. More than ever, a large number of foreigners participate in the practical studies. Belgium comes next; recent statistics show that she has rapidly developed her industrial schools and counts now fifty-nine technical and thirty-two industrial, not mentioning her commercial high schools. Surely some one of our philanthropists and wealthy textile

manufactures could immortalize his name by giving a foundation to such an institute. *When* are we going to learn?"

MORDANTS, THEIR NATURE, AND HOW TO MAKE THEM.

OIL MORDANTS FOR ANILINE COLORS.

Say two pounds of oil are agitated with seven and one-half of alcohol, seven and one-half water are added and one-half sulphuric acid. The whole must be thoroughly mixed to an emulsion before use. In France, where alcohol is dear, the acid is added directly to the oil, then the water poured in, and the whole agitated.

TANNIN AS A MORDANT, AND HOW TO MAKE.

Tannin, as Dr. K. M. Kurtz observes in the *Wurt Groltt*, came largely into the dyeing trade as a mordant for cotton, union cloth, silk, mixed silk, artificial wool, etc., and justly so, for while the dyer, by using other tannin materials as sumac, galls, myrobalans, divi divi (articles of which the value varies according to the degree of maturity, the time of plucking, the method of drying, etc.), is compelled to crush, grind, powder, sift, boil and filter them. Tannin, which is a constant product of uniform composition, can be dissolved in water without further preparation. Tannin is certainly not cheaper, but much time, labor, and other incidental expenses are saved by its use, and it works cleaner. One pound of tannin represents the effect of about forty pounds of sumac, eighteen pounds of myrobalans, fourteen pounds of divi divi, and eleven pounds of galls, besides which from five to seven per cent. of

dyestuff is economized; hence, it arises that upon tanned goods the color comes out purer and brighter in an unequalled degree. Commercial tannin is now prepared chiefly from so-called Chinese and Japanese galls (from sumac). These are well dried, converted in a stamping mill to the finest powder, which is extracted four times systematically with a mixture of three or four times its weight of the best rectified alcohol and ether, in small or large cylindrical vessels of tin plate, kept in agitation by hand or mechanical means. The alcoholic solution is then distilled off by steam in a copper retort, and the remaining tannin taken up in about double or three times the quantity of hot condensation water, and set aside for a day. There now separates a rather considerable quantity of a green, resinous body insoluble in water, on the surface of the tannin solution, from which it is drawn off. If the solution is not clear, it may be passed through a charcoal filter. It is now evaporated in a double-cased boiler in the steam bath till the water is driven off. As a tannin solution in the air, particularly if hot, darkens strongly, the access of the air is to be restricted as much as possible, and for this a copper vacuum apparatus is recommended. When the water is driven off the thick fluid tannin is poured into moulds of tin plate, where it is left to stiffen, after which it is powdered in the so-called indigo mills with cannon-balls and sifted, as it is usually required in commerce, as a fine powder, which quickly dissolves. The more ether is employed in the extraction of the galls in proportion to the alcohol, the whiter is the tannin. Alcohol alone dissolves a considerable amount of dyestuff. Water cannot be used for a first extract, as it dissolves too much dye and other foreign substance, which cannot then be separated from the solution. For many technical purposes a tannin prepared alone with a spirit of high degree is as valuable as that prepared

with alcoholic ether, to which a smell of ether obstinately adheres. The consumption of tannin besides being largely used in pharmacy, in the wine and beer pathology, is at present very much on the increase, and its production is a very profitable branch of many chemical manufactories. Many dyers combine with the employment of tannin that of so-called oil or animal mordants (olein sulphate of ammonia) which gives more fire to the color, especially carmine, and thus leads to an economy of dyeing material. The preparation is simple. In a large dish, to about sixty pounds of best cottonseed oil are added thirty pounds of sulphuric acid, at 66° B. with gradual stirring. The mass becomes heated, evolves much sulphurous acid, and is stirred till it becomes quite homogeneous, when the mixture (the olein sulphuric acid) has cooled again, so much dilute spirit of ammonia is added with continued stirring, that the remaining liquor smells of it, weighs about five cwt., and presents a homogeneous bright, yellow, soapy paste, but whether the above preparation, in proportion to its effect, will not become too dear, Dr. Kurtz cannot decide.

THE APPLICATION OF TANNIC ACID AND GLUE FOR FIXING ANILINE COLORS.

The fixing of aniline colors on vegetable fibres is far more difficult than on animal fibres, as in the former case mordants are always requisite, but in the latter they are mostly unnecessary or of secondary importance. Wool is often more beautifully and vividly dyed with aniline colors, without mordanting, and the mordants are used chiefly either for the purpose of attaining a higher temperature in the dye bath, or to give the dyestuff greater permanency, but especially also to avoid the unevenness which so easily occurs with aniline dyes upon wool.

Cotton and linen fibres will not combine with tar colors without a mordanting medium; and it is necessary, in all cases, to look out for materials which are capable of rendering the soluble aniline dyes insoluble on the fibres. The series is by no means small, and it is only a question to decide which of the mordants used in practice is the most advantageous, and will yield at the same time the finest and cheapest colors. This question cannot well be decided by experiments on a small scale. It is only by operating with large quantities, and by manufacturing processes, that results are obtained which lead to a correct decision. The dyer in fine colors will, for the most part, have no opportunity to decide which is the most suitable method for fixing aniline colors upon cotton. In this question the productiveness of the bath employed must be well considered, and their value be deducted from the total cost in the calculation of the materials used.

It would lead too far to discuss here the various methods of fixing aniline colors. They have nearly all been displaced by the method of mordanting with tannic acid; and many expert practical men have, by this time, decided that tannic acid is the medium to be preferred to all other mordants for dyeing with aniline colors on cotton. This is specially the case with magenta and aniline green (iodine green). These two dyestuffs yield, with tannic acid, beautifully-colored and completely insoluble combinations; and thus tannin answers most fully the purpose of a genuine mordant. Tannin is, nevertheless, a tolerably expensive preparation, and, consequently, an effort should be made to find a substitute for it—a mordant which either renders it quite superfluous or admits of some economy in its use. The materials hitherto proposed—oleic and stearic acids in soaps, etc.—do not satisfy the requirements, and it is not likely that a substitute will easily be found to displace tannin entirely. A long series of experiments on a large

scale has led to the conviction that tannin (either pure or in sumac) is, temporarily at least, indispensable. On the other hand, tannic acid may be considerably economized by combining it with size before dyeing, and thus using tannin and size at the same time as a mordant. In order, then, to produce a certain tint with magenta or iodine green, or any other aniline color, far less tannin is required. In fact, the same result may be obtained with half the tannin which is obtained with double the quantity, without the use of size, as the following experiment will illustrate: In the first place the cotton was dipped in a tannic-acid bath, then divided into two parts, the one drawn through a weak solution of size or gelatine, and the other dyed directly in a bath of known concentration at a certain temperature. The portion drawn through the solution of size was then dyed in a bath exactly similar, and the two samples were then compared.

The cotton mordanted with tannin and size was by far more fully and deeply dyed, and it may be affirmed that, by using a size bath after the tannin bath, the latter may be used much weaker than when tannin alone is used for fixing the dyestuff. In this way tannic acid may be economized to a considerable extent. By diluting the tannic solution more and more, and comparing the results with tannin and size, and with tannin alone, a point is reached in which both operations yield exactly the same shades. When this point is reached, by comparing the degree of concentration of both tannin baths, it may be determined what the saving of tannin has been; this depends much upon the quality of the tannin, so that the experiments have not yet yielded a result which could be reduced to figures. The samples of tannin obtained from different sources gave different results; and, in one case, a greater saving could be effected with the use of the size bath, and in another, comparatively less. Evidently a combination takes

place between the size and the tannic acid, which then acts on the dyestuff of the aniline differently from the tannin alone.

The following extract from the *Chemical Review* shows that a much cheaper mordant than tannin has been found, as follows:—

MORDANT FOR ANILINE COLORS ON COTTON.

Until recently, aniline colors have been fixed on cotton by treatment with animal matter, as albumen, gelatine, or with galls, sumac, tannin, as well as by the use of mordants of acetate of alumina, soap, and oil. Dr. Reiman, however, directs attention to the peculiar power possessed by starch of abstracting aniline colors from solutions. This is not due to the gluten it contains, since this property is shared equally by wheat and potato starch; and he founded upon this a beautiful method for fixing aniline colors on cotton. It is immaterial whether the color is attracted by the starch suspended in the liquid or attached to the fibre. If the cotton is saturated with a thin paste of potato or wheat starch and steeped in a dye bath of aniline color, it will receive the corresponding shade.

MORDANTS FOR ANILINE COLORS.

Many things have been introduced from time to time, with more or less success, to enable cotton goods to take up the colors quickly and brightly.

The following are the various mordants and their results: Sumac has always found more or less favor, and questionably it has its advantages. It is cheap, the liquor can be used for other purposes; and most dyers know how to use it, but are afraid to discontinue its use in favor of a new thing of which they know but little.

Stannate of soda; the principal advantage claimed for this is that it leaves the goods whiter than sumac, it does not require much, or, indeed, any rinsing. On the other hand, it is considered dearer than the former, and it does not stand exposure well. In articles of dress, garment dyers are often requested to retain black stripes and spots that may be in the goods, which stannate in a great measure discharges. It certainly rots the work to some extent, and I have found in its use black spots formed upon the work, similar to those found occasionally by the tin process in cochineal scarlet dyeing.

METHYLATED SPIRIT AS A MORDANT.

As this takes about eight cents' worth to about twelve yards of dress material, it is generally considered too dear. But it is clean, works tolerably even, and it retains stripes, spots, etc.

N. B.—Methylated spirit is much cheaper in England than alcohol, from which it is made by adding a portion of shellac to prevent its being used for anything other than manufacturing purposes.

TANNIC ACID AND ITS ADVANTAGES.

This unquestionably is superior to all the foregoing, and is applicable to all purposes where any of the former can be used, and in many instances where they would not avail. The chief argument against it is its price, although it is affirmed by some practical men, considering all things, to be as economical as either of the foregoing, as it is quite soluble, easily fixes itself, and one pound will mordant one hundred pounds of goods in half an hour.

IMPROVED ANILINE MORDANT.

This differs from all the foregoing in several important respects, it is about one-quarter the price of tannic acid, while its results are similar in every respect, it is a much brighter and cleaner mordant than sumac, and has none of the disadvantages of stannate of soda. Indeed, it strengthens the work rather than otherwise, it is half the price of methylated spirits, it works evenly, and requires no rinsing. Goods can be mordanted with it from five to fifteen minutes; it is chiefly recommended for red, violet, brown, green, slate, grays, etc., on cotton or mixed goods.

The inventor is a practical dyer, supplies printed instructions, and may be communicated with on any points relative to his invention. Some think it a saving to use half the quantity of tannic or aniline mordant, and about three times its weight of glycerine; others use about two parts of mordant and two parts of best starch; whilst others still recommend to mordant in a prepared oil bath; and others consider oil and glycerine combined to be an improvement.

STARCH VALUABLE TO FIX COLORS.

All loose colors, especially anilines on mixed goods, should be passed hot in a clear, well-strained starch liquor. It fixes the color and gives substance to the goods; it should of course be boiled and then used thin; it hurts no color.

ALEPPO GALLS AS AN ANILINE MORDANT.

There are many kinds of nutgalls, but the above are the best. As they are so well known it is only requisite to say that they are of a greenish blue tint

and should be free from worm holes. As a mordant, they are quite valuable and only require bruising or grinding, and boiling. Decant the clear liquor and steep the goods in them. From one to eight pounds are required for one hundred pounds of goods according to shade.

CHINA GALLS AS AN ANILINE MORDANT.

They are of a much later introduction in the dyeing trade. Instead of being a nut in the proper sense of the term, they are not, as they much more resemble a bony-looking hollow shell, of all conceivable shapes; no two excrescences form alike as they ooze from the tree in the form of gum. They are much the color of dry bones. They are reduced to a fine powder, and used in the same way as nutgalls.

MYROBALANS

are also of recent introduction into the dyeing trade. They are more of the egg shape than otherwise, and are much the same color as low quality nutgalls—a yellow drab. No doubt they had been used some time for tanning purposes before they were much thought of for dyeing purposes. For both they are very useful. Like galls, the quality varies very much, and it requires much judgment in their selection, as some are very valuable, while others are not much stronger than sumac. They are used in the same way as sumac, and should at least be double its strength.

SUMAC.

An article so well known and so easily obtained only requires a passing word for the sake of the uninitiated.

The best kind has always been claimed as the Sicily, but at the present time a counter claim is put in for that of South American growth as being often as good as the Sicily. It is sold invariably in a ground state as a greenish-drab powder, and if good, as soon as a barrel is opened it emits a scent quite strongly resembling whiskey. Eight to one hundred pounds suffices for some colors, while scarlets and other spirit colors require even forty to one hundred pounds. I have seen as much as sixty pounds recommended, as the passage through the tin liquors cuts it considerable.

CUTCH

is the name used for catechu, and is well known as a drug for fast brown. It has likewise been used as a mordant for aniline colors. That it does contain a large amount of tannin is quite true, but it gives a deep body or color to the goods, it can only be used to advantage as a mordant for dark colors. But as other mordants can be used for light or dark colors, this finds but little favor as an aniline mordant.

VALONIA.

This is a nut containing a considerable amount of tannin, and for that reason has been used to some extent for leather, and to a less extent for mordanting purposes. I, however, find nothing in it to give it a preference over some of the other drugs as an aniline mordant.

There are many other things that have been used, and which I might have described did I attach sufficient importance to them, but, as I have given the best, let that be a sufficient reason for omitting them.

As other mordants, with their auxiliaries, are treated upon in the article on dyestuffs and chemicals, I shall now leave this special branch, which may be called the dry mordants, for the other branch, which may be called the wet mordants.

SCARLET SPIRITS.

Three pounds muriatic acid, three pounds pure double nitric acid. Add two ounces sal-ammoniac, and feed with one and one-half pounds granulated tin.

LAC SCARLET SPIRITS.

Three gallons muriatic acid, one gallon nitric, two gallons water; kill with six pounds of tin.

SCARLET SPIRITS, ANOTHER WAY.

Put any quantity of nitric acid and the same of clear water into a stoneware pot, the water first, then one pound of muriatic acid to every five pounds of the above, and give two ounces of tin to the pound of spirits. Add it very slowly for two or three days, otherwise it may fire, which would precipitate the nitric acid, when you would lose the spirit.

SOLUTION OF TIN FOR GENERAL PURPOSES.

Nine quarts muriatic acid, one quart nitric; give as much feathered tin as it will take, the tin to be added at several times.

MURIATE OF TIN.

Same as lac scarlet spirits, without the nitric acid.

DOUBLE MURIATE OF TIN.

Take muriatic acid in a strong stone pot, and, in a warm place, gradually feed it with as much tin as it will take, which should be at least three ounces to the pound suitable for cotton.

CRIMSON SPIRIT FOR CARDINAL SHADE.

Three quarts nitric acid, five quarts muriatic acid, one pound salpetre; give as much tin as it will take.

NITRATE OF TIN

is aqua-fortis killed with tin, which is used in dyeing yellows, buffs, scarlets and crimsons.

NITRIC ACID OR AQUA-FORTIS.

This spirit is much used in dyeing. It is made from nitrate of potassa, or nitrate of soda and sulphuric acid. It will dye silk yellow of itself, but is generally killed with tin for worsteds and wollens.

NITRATE OF IRON

is aqua-fortis killed with iron or copperas. It is used for dyeing buffs upon cotton, and as a mordant or preparation for other colors.

NITRATE OF COPPER

is aqua-fortis killed with copper (sulphate of copper).

OXALIC TIN.

This is a most valuable spirit for dyeing all grain colors, brighter colors being obtained by it than by either nitrate of tin or muriate of tin. It is the best destroyer of gum sometimes found in lac, and

which is very injurious in dyeing. In woolens it is very penetrating, dyeing the piece through, however strong, without leaving any white appearance. As yet it is only partially known by the dyers, but much approved by those who have tested its excellency.

Note.—If not convenient to make your own spirits they can be bought ready prepared in most large cities.

SUBSTITUTE FOR CREAM OF TARTAR.

A mixture of thirty parts Glauber salts with twenty parts sulphate of zinc will be in many cases an excellent substitute for cream of tartar.

MORDANT IN LIEU OF TARTAR IN WOOL DYEING.

The following mixtures are employed:—

No. 1. Alum, twenty-two pounds; water, eleven quarts.

No. 2. Oxalic acid, seven and one-half pounds; water, five and one-fourth gallons.

No. 3. Acetic acid, four and one-fourth pounds.

These three liquors are then mixed together producing a mixture which only costs $3\frac{1}{2}$ cents for two pints, or about half the price of the ordinary tartar bath.

CHROME, OR BICHROMATE OF POTASH.

This is a red orange crystal, and is of very great use as a mordant in dyeing blacks and other dark colors upon worsted and woolen goods, giving greater permanency than any other mordant previously employed. Its excellent properties, in this respect, have only of late been appreciated, and it is now becoming generally used. It effects a great saving of time and expense, etc. (See article upon its proper use.)

BLACK MORDANT.

Sometimes called black iron liquor, is made thus: Forty gallons of water, two pounds copperas, one-half pound argol, two ounces bluestone; dissolve each separately, then add them together, and when settled pour off the clear liquor for use.

PYROLIGNITE OF IRON.

Dissolve ten pounds of pyrolignite of lime in fifteen gallons of water, and proceed in the same way as with the acetate of iron. This method is intended for consumers.

ACETATE OF IRON.

Dissolve ten pounds of lime in fifteen gallons of water, then add to it gradually a solution of copperas (sulphate of iron) as long as any precipitate is perceivable. The clear liquor is the acetate of iron.

SULPHATE OF IRON.

Gradually dissolve four pounds of copperas in five pounds nitric acid, then add two gallons of water; one quart of this solution to ten quarts of water (as a stock tub) will produce good results. The solution should be added as the tub weakens; next to no inconvenience is occasioned in the making of this, as it does not fume like nitrate of iron.

NITRATE OF IRON.

Two gallons aqua-fortis, five and one-half pounds old iron hoop with the rust beaten off; add the iron by degrees, after putting the above into a six-gallon pot (stoneware). In cold weather it will be required to be kept warm until dissolved.

RED LIQUOR.

Mix sulphate of potassa or ammonia with a solution of tersulphate of peroxide of iron. See also preparation of the acetate of alumina or red liquor and acetate of alumina or red liquor.

A NEW MORDANT FOR DYEING ANILINE BLUE ON COTTON.

Prepare the cotton with double muriate of zinc, and, without washing, take it to the dye bath, which also contains a small quantity of muriate of zinc, then add to the bath gradually the aniline blue dissolved, and heat the bath gradually up to boiling point.

LIQUID TARTAR.

Dissolve twenty-two pounds of alum in thirty-five quarts of water, and seven and one-half pounds of oxalic acid in seventeen and one-half quarts of water; mix the two, and add four pounds six ounces of acetic acid, stirring carefully. One pound of this is equal to two pounds of tartar.

LIQUID TARTAR.

White argol, ten pounds; sulphate of soda, ten pounds; single sulphuric acid at 90° F., six quarts. Set it at 17° F.

PREPARATION OF THE ACETATE OF ALUMINA OR RED LIQUOR.

Dissolve one hundred and twenty parts of alum in five hundred parts boiling water. When dissolved add a solution of one hundred and five parts acetate of lead (sugar of lead) with five hundred

parts of water. Filter, and add water to the clear liquor until it marks 5° B. This clear liquor is the pure solution of acetate of alumina.

ACETATE OF ALUMINA OR RED LIQUOR.

Dissolve four parts of pure alum, and in a separate vessel three parts of sugar of lead, then add together and when settled pour off the clear liquor.

ACETATE OF ALUMINA.

Dissolve separately forty parts sulphate of alum, fifty parts sugar of lead, three and one-half parts of sal-soda (washing soda), then add together and either filter or pour off the clear liquor.

SULPHATE OF ALUM.

Alum prepared with sulphuric acid in its manufacture.

STANNATE OF SODA.

A preparation of tin and alkali, used as a cotton mordant. After which a run through a sulphuric acid bath standing at 2° B. is good for it.

RED LIQUOR,

otherwise called acetate of alumina (see former description).

TARTAR EMETIC.

A preparation of double tartrate of antimony and potash.

For methyline blue and marine blue on cotton, mordant with tannin and tartar emetic.

REMARKS ON DYE WARES AND CHEMICALS AND THEIR USE.

Alum.—This salt is prepared from certain clays containing pyrites. It is used very extensively in dyeing, in consequence of the attraction which alumina has for coloring matter. It is used as a mordant or base for mock crimson, maroon, claret, purple, etc. Alum is sometimes used after chromings, when the color is too full, being made lighter by adding a little. When the shade is too blue, a little alum will redden it.

Annotta.—This is obtained from an American tree, called *Bixa orellana*, and is imported in the form of a paste, of a brick-red color. It is soluble, or spent by pearlash at boiling heat. It is used in dyeing various colors upon cotton and silks, viz.: buff, salmon, flat yellow, orange, and some fawn shades of drab. The colors may be raised by running in weak acid. Annotta was at one time extensively used, but is largely discarded for the aniline colors, which are far preferable.

Archil.—This is a blue-red or violet paste, obtained from the *Lichen orchella*, grown in the south of France, and in the Canary Islands, where the best is produced. Alone, it produces a ruby color, and a very light violet by adding a little ammonia, or other alkalies. It reddens indigo blues, and, combined with logwood, produces purple, or with acids, red.

Ammonia.—Liquid ammonia is generally distilled from gas liquor. It is sometimes made from ammoniacal salts and lime, but the best for dyeing purposes is made from urine. It is used by dyers for the purpose of bluing crimsons, clarets, etc., dyed with archil, and for cleaning purposes.

Argol.—It is obtained from the juice of the grape, and is a crystallized incrustation generally found in wine casks. It becomes white when purified by solution and crystallization, and is then called cream of tartar. In dyeing, argol combined with alum is generally used in the preparation or boiling of mock crimson, maroons, clarets, and purples. It is excellent in giving solidity to these and other colors. Being a weak acid, it is the best for dyeing bright greens, working well with extract, sulphate of indigo, and is not destructive to fustic. It is frequently used in dyeing the spirit colors, as scarlet, orange, and grain crimson, but cream of tartar is preferable for yellows, pinks, salmons, and other light spirit colors.

Prussiate of Potash.—This is made from pearlash and animal substances, as horns and hoofs. It is used for dyeing Prussian blues, varying from a sky to a royal blue, upon cotton and silk to a very limited extent.

Quercitron Bark.—This is obtained from the yellow oak (*Quercus infectoria*), growing in North America. It furnishes an excellent yellow color. Alum and muriate of tin are the principal mordants employed in dyeing woolen and cotton, but oxalic tin is the most effective. It produces brilliant drabs upon cotton with nitrate of iron. It is often only referred to as bark.

Safflower.—The flowers of the *Carthamus tinctorius*, grown chiefly in Spain, contain two coloring matters, yellow and red. The yellow is carried off by well washing in water until the flowers assume a bright crimson appearance. The red coloring matter is extracted by steeping in pearlash and water, with occasional stirring. The liquor is then pressed from the flower, and is ready for dyeing pink upon cotton fabrics combined with a little

tartaric or sulphuric acid. It is little used since the introduction of saffronine and eosine.

Super Argol.—It is made from sal-enixum, or sulphate of soda, and sometimes from common salt cake. As an acid, it is used for dyeing drabs, and greens when turmeric is used instead of fustic; also for olives and browns. It is much cheaper than argol or brown tartar, and in some cases is preferable.

Camwood and Barwood are dark red woods containing strong coloring matter, which is of a permanent nature, and is generally used for dyeing browns and reds upon wool and cotton goods. They are most soluble in sulphuric acid diluted with water. In the dyeing of woolens, it is sometimes employed as a substitute for red sanders, producing a more fiery appearance in browns of light and middle shades.

Catechu.—Catechu is an extract from the heart-wood of the khair tree of the East Indies. The coloring matter is extracted by sulphate of copper. Bichromate of potash is used to darken it. It is used in dyeing cotton a variety of shades, varying from a light drab to a dark brown.

Chemic or Sulphate of Indigo.—This is blue paste prepared from indigo, and contains more indigo in solution than any other preparation of it whatever. For dyeing purposes it is thus made: Put into a stone jar thirty-six pounds of sulphuric acid, to which add twelve pounds of ground indigo gradually; stir well for one hour. After standing for a few hours it will be fit for use. This chemic is much cheaper than extract of indigo for dyeing some colors, as greens, olives and browns. Extracts of indigo are only modifications of this chemic, being partly neutralized and filtered.

French Berry, or Persian Berry.—This is the fruit of the *Rhamnus infectorius.* It yields a bright yellow coloring matter, which is employed in dyeing light yellow shades upon cotton; also, for light greens, with either extract of indigo or prussiate of potash. It also gives the fawn shade to drabs. Combined with alum or crystals of tin a fine golden yellow is obtained.

Saunders, or Red Sandal.—This is the wood of the *Pterocarpus santalinus*, grown in India. It possesses deep red coloring matter, and is used chiefly in dyeing woolen goods. It is more permanent than peach wood, though not of so bright a color.

Sapan Wood.—This wood produces a red color similar to that obtained from peach wood, but it is not much used for dyeing purposes. It is generally sold in the liquid state, and is used in padding and printing.

Sumac.—This astringent vegetable production is extensively used, chiefly for cotton dyeing. It is used as the base of many colors. The best is that imported from Sicily. It has great affinity for iron, which, when combined with sumac in certain proportions, imparts to cotton a variety of shades from silver drab to black. It is sometimes spelled sumack, and often in the old country abbreviated to mack and mac.

Fustic, or Young Fustic.—The best old fustic is imported from Cuba, and yields a permanent yellow coloring matter, when combined with alum and argol, in dyeing various shades of greens. It is also used after chroming for olives of different shades. Young fustic is chiefly used in dyeing yellows, oranges and scarlets. It gives a bright yellow when combined with nitrate, muriate or oxalic tin, the last being the most effectual. The young dyes brighter shades than the old.

Galls.—The gall nut is chiefly imported from Aleppo. It yields an astringent black coloring matter when combined with copperas and logwood; and it is generally employed in dyeing silver drabs upon cotton, when combined with nitrate of iron. As a dyewood it gives greater solidity than sumac for those light shades.

Indigo is produced from the leaves of *Indigofera*, a plant cultivated in South America, East Indies, etc. It is a very permanent coloring matter, employed in dyeing the majority of colors, varying from a drab to an indigo blue. The color produced by it is often imitated by dyeing with logwood, worsteds, and woolens which have previously undergone the chroming process.

Kermes or Lac Dye is obtained from an insect deposited on different species of trees in the East Indies and other places. It contains red coloring matter, very like that of cochineal, and was frequently used as a substitute for it, being thought by some chemists to possess more permanence. It dyes good scarlets along with nitrate of tin, or oxalic tin and tartar. This dye is much cheaper than cochineal, and the difference of color is only slightly perceptible. Like cochineal, it is now little used.

Logwood.—This is a dark-red dyewood, and is much employed in dyeing black upon silk, cotton, and woolen; also for blues and many other colors. Logwood, on first being introduced into England, was denounced by the cultivators of the native wood, and even prohibited in England by Queen Elizabeth. All imported was to be destroyed, nor was it allowed to be used until the reign of Charles the Second; thus proving that zeal is often blind.

Peach wood, Lima wood and Brazil wood.—These are used for dyeing mock crimsons, maroons, and clarets, upon worsted, woolen and cotton goods.

They dye bright colors, after a preparation of alum, and darker shades of the same colors, after a preparation of chrome. Hypernic is the American name for them.

Madder.—This is obtained from the root of the *Rubia tinctorum*, which grows wild in the south of Europe, etc. It is an article of great importance in dyeing. Madder possesses five distinct coloring principles, viz., madder red, madder purple, madder orange, madder yellow, and madder brown. These colors are of most use to calico printers. It is also used by dyers to deaden drabs. The brighter the color, and stronger the scent, the better the quality.

Cochineal is a small Mexican insect containing strong coloring matter, very permanent. It is used in dyeing pinks, rose colors, oranges, scarlets and crimsons. The mode of extracting the coloring matter is by means of nitrate of tin and muriate of tin; oxalic tin gives the brightest color. These acids for bright shades are combined with white or brown tartar. It is largely replaced now by coal-tar color.

Cudbear (see also Archil).—Cudbear is a dry powder of a fine blue-red color, and will dye a ruby itself, either upon silk, worsted, or woolen; a violet, with a little logwood; a purple or adelaide, by previously undergoing the chroming process. It is used in dyeing lavenders, drabs and various other shades for the red part of the color.

Tumeric.—This is the root of a plant cultivated in the East Indies, and contains much yellow coloring matter. It is frequently used instead of fustic, but is not so permanent.

Myrabolins.—An egg-shaped nut with much the same properties as galls, though not so strong but much stronger than sumac, otherwise used the same.

Glauber's Salt and its Use in Dyeing.—Neutral sulphate of soda is mostly known as Glauber's salt and sold in white crystals. It contains remarkable chemical properties rendering it very valuable in woolen dyeing. By combining with acid the neutral sulphate is transformed into bi-sulphate, rendering it very valuable in the tinctorial art, not only in aniline colors, but if introduced into archil, cudbear, redwoods, turmeric, madder, logwood, fustic, etc., much more of these baths are exhausted and utilized. With soluble indigo equally good results are obtained, though by an opposite principle, namely, preventing a too rapid or uneven fixation. It solubility presents a singular phenomena, as at 32° F., with one hundred parts of water only five per cent. is dissolved. The solubility then commences and rapidly reaches its maximum at 90° F., when one hundred parts of water will dissolve three hundred and twenty-two parts of the salt, and at higher temperature the solubility lessens. About ten pounds may be used with advantage to one hundred pounds of woolen goods, whether dyed with aniline or woods.

Ammonia Paste.—Strong ammonia, one quart; water, one quart; ground cochineal, two pounds; stir them all well together in a stone pot, tie up the mouth of it tightly, and set it to work in a slightly warm place for two days, when it will be fit for use. This will dye much bluer and deeper shades than cochineal.

Green Ebony appears to be little known in the United States, but it is to be preferred to fustic for yellows and greens, as it is bright and stands the acid better. It is also used for best blacks on silk in place of fustic, as not being so harsh.

Bi-sulphate Soda, used in place of Glauber's salt; it contains more acid than Glauber's salt, and will, in

some cases, cause the color to be taken up without additional acid.

Many of the mordants here given are little used now. But this book may not be considered perfect, if not given, by those who still have a preference for the good old ways.

COLORS.—PRIMARY OR ELEMENTARY COLORS.

There are three elementary colors, termed "primary," from which all other colors are derived, and there are three composite colors, termed "secondary," formed by the combination of two of the primary colors. The three primary colors are red, yellow and blue; and the three secondary colors are orange (the union of red and yellow), green (the union of yellow and blue), and violet (the union of blue and red). There is another color called indigo (the union of blue and violet), which, with the three primary and three secondary colors, make the seven colors of the solar spectrum, often designated as the "prismatic colors."

If a pencil of white solar light be passed through a glass prism, it will be refracted into the seven colors as just mentioned, and conversely, the merging of the seven colors into one, will produce a white pencil of light. If upon a disk the seven colors, or even the three primary colors, are painted, and the disk made to revolve with sufficient rapidity to blend the colors, the effect to the eye will be a white color. This may be termed the "optical composition" of these colors. On the other hand, if the three primary colors in pigments be mixed in certain proportions, black will be produced, and this may be termed the "physical composition" of these colors.

The optical composition and the physical composition of colors are two branches of the same

study. The one belongs to the designer of the woven fabrics, and the other to the art of the dyer. There are certain expressions applied to colors that it may not be amiss to speak of, namely, tone, shade, tint and hue. The tone of a color is a term used to denote the modification which the color, in its greatest purity, experiences by the addition of black or white. By adding black to a pure color you heighten the tone and produce what is called a shade. By adding white to a pure color, you lower the tone and produce a tint. The expression hue is employed to designate the modifications that a color undergoes by receiving a small quantity of another.

It is most surprising that from three colors, red, yellow and blue, all the colors and shades are produced, yet such is the fact. By mixing either of the three, say, for instance, blue and yellow, a green is formed, or the red and yellow, an orange. These are called secondary colors, as also the blue and red by which you get a violet. Even secondary colors can be very much varied, as for example, give less of the red and more of the yellow, you get an amber, or give more of the red and less of the yellow, you have a scarlet. By the same rule take less of the yellow and more of the blue, and you have a peacock, or take most of the blue and less of the red you have a purple.

Now from these secondary colors come all the fuller, richer and darker colors, and they in their turn, by being made thinner, produce what may be called their own reflections. Thus a peacock produces sea-green; violet a mauve or lavender, according to its blueness or redness; brown in like manner produces a drab. The reflection is complete, as a yellow brown produces a yellow drab, while a red shade produces a red drab. Now a brown must at least have three colors in its formation, red, yellow and blue. It will at once be seen that its hue will depend upon the relative proportions of these

three colors which go into its composition. For instance, where yellow and red prevail it will be medium, and when blue prevails it will be dark just in proportion to the intensity of the blue. Brown then can be used according to its temperament, to mix with other colors to darken them, provided always that the colors chosen have the desired sympathy to unite. As for example, take four parts roseine and one part Bismarck you get a maroon, or in lieu of Bismarck add violet and you have a claret; or take your proportions according to the strength of the colors, say four parts green, two parts blue violet, two parts Bismarck, and you have a slate color bordering upon black. But vary them and you can ring what changes of brown you desire with them. Again, take violet and green, by them you can get a decided blue or any shade of peacock, as they unite perfectly, the green being actually made from violet. It was in watching the actions and transformations of such things in my laboratory, that I conceived the idea of working out into a system of practical development all the missing links in the aniline colors and shades. The general principles of the same I now for the first time introduce to the reader.

THE CONTRASTING OF COLORS.

Field's theory is, that colors complementary to each other present a neutral gray, as their mean color, and this theory is still taught in the schools from his text-book. Now this is more fanciful than correct, as will be admitted if the harmonious grouping of colors is carefully studied. Let me give some examples:—

The mean color between pure red and pure green is not gray, but olive green, a sort of dull yellow.

The mean between pure yellow and pure purple is reddish gray.

The mean between pure blue and pure orange is also reddish gray.

Nothing is more self-evident than that the complementary of pure red is a sea-green, such as may be seen in fresh verdigris which is as much green as blue.

The true complementary of pure green is clear pink of the blue cast. The true complementary of pure blue is a pure yellow.

HARMONY, DISCORD AND CONTRAST OF COLORS.

By harmony of colors we understand colors placed side by side in such a manner that they do not injure the effect of each other, rather, on the contrary, complete each other, *i. e.*, they gain in intensity.

Harmony in colors does not depend on the will or caprice or personal taste of an individual, but it is based on the unchangeable laws of nature, which we shall immediately discuss.

Red and Green.—A red body reflects green rays, while, on the other hand, a green body reflects red rays. Therefore, green is the color which completes red, and, similarly, red completes green. Both, therefore, gain in intensity.

Blue and Orange.—A blue body often reflects orange rays, and, inversely, an orange body will frequently reflect the blue rays. Orange is, therefore, the complementary color of blue, and *vice versa;* therefore each intensifies the other.

Violet and Greenish Yellow.—A violet body reflects greenish yellow, and, inversely, a greenish-yellow body reflects violet. Both colors, therefore, complete and intensify each other.

Indigo and Yellow.—Indigo reflects yellow, and yellow indigo rays; hence they are complementary and intensify each other.

It would carry us too far to describe all the other colors which are complementary.

A. Two simple colors.

Red and Yellow.—Red appears darker purple, because the indigo rays are imparted to it from the yellow; yellow appears greenish, because green rays are imparted to it from the red.

Yellow and Blue.—Yellow takes away the orange rays from the blue, and appears reddish; blue absorbs the indigo rays from the yellow, and appears darker.

Blue and Red.—Blue appears greenish from the effects of the green rays of the red; red, on the contrary, from the orange rays of the blue, appears yellowish.

B. A compound color and a primary color, the latter being contained in the former.

Red and Orange.—Red absorbs the blue rays from the orange and appears bluish violet; orange is influenced by the green rays of the red and appears yellowish, *i. e.*, lighter.

Red and Violet.—Red beside violet appears yellower, because it receives the yellow rays from the latter; violet appears darker, more dusky, because greenish rays are absorbed by it.

Orange and Yellow.—Orange loses from its yellow and appears redder; the yellow appears more greenish.

Green and Yellow.—Green loses its yellow and appears darker, more blue; the yellow is influenced by the reddish rays of the green, and it appears reddish, *i. e.*, orange.

Green and Blue.—The green appears lighter, more yellow, as if it were faded; the blue appears reddish alongside of the green, *i. e.*, like violet.

Violet and Blue.—The violet loses its blue and assumes a reddish appearance in comparison with the blue, that is, greenish.

C. Two compound colors which have one primary color in common.

Orange and Green.—Both colors contain rays of yellow, and each loses some of its tint by contact; the orange appearing more red, and the green more blue.

Green and Violet.—Both of these colors have blue in common, and hence by contact each loses its appearance; the green becoming more blue, and the violet more red.

Violet and Orange.—These two colors have the red rays in common, which are lessened by contact; the violet becoming more blue, while the orange appears more yellowish.

It has been stated above that red reflects green rays and the green reflects the red rays, that all colors have their completing or complementary shades, which may be observed by the eye. This statement will be confirmed in the following:—

If one fixes his eye for some time on a red object and then quickly looks away or closes the eye, it appears just as if the same object appeared before him in green. Similarly, a green object when stared at produces a red effect when the eye looks away.

When one looks at a blue object for some time there is produced in the eye the sensation as if one saw an orange object, and contrariwise, an orange-colored object appears as if it were blue.

When these colors are seen singly, as for instance, in the form of flowers or some other ornamentation, on a light gray background, and closely watched for some time it will be found that after a while the gray ground will appear slightly tinged by the complementary coloring in the same way; with

Red, the gray ground is tinged with greenish.
Green, the gray ground is tinged with reddish.
Blue, the gray ground is tinged with orange.
Orange, the gray ground is tinged with bluish.
Violet, the gray ground is tinged with yellowish.

With wall-papers and woven fabrics these facts have often been noticed and even have led to serious disputes. Thus, for instance, at Paris, in a factory of wall-papers, a case occurred in which a color mixer was found fault with for having used greenish gray instead of an ash gray as a background for a pattern of red flowers and garlands. His justification, however, was at hand, in the shape of a remnant of the gray pigment, which, when examined by itself, was in reality of ash-gray tint. It was Chevreul, the distinguished chemist and director of the Gobelin Manufactory at Paris, who related the previous case, and the difficulty was settled by his showing that the red flowers imparted the greenish tint to the gray ground. A similar circumstance occurred to a weaver. He received some black and blue yarn from a dealer, by which he was to produce a blue and black checkered cloth. When the goods were given to the merchant he saw that the black was not so intense as the sample, and immediately charged the innocent weaver with having fraudulently substituted his beautiful black for a faded one. The weaver was on the point of being punished by law, when Chevreul, in his expert

testimony on the matter, clearly showed that the blue portions of the fabric reflected sufficient of the yellow rays to make the black appear brownish. Hence it is shown by experience that in such cases, as with the manufacture of wall-paper, the gray ground of the paper should contain some of the color which is to be used for the design which is to be placed on the same, in order to satisfy the complementary color.

If, in the case of the Parisian wall paper, just mentioned, some red had been mixed with the gray, the ground would not have appeared greenish; and also, if the black yarn in the case of the weaver had been dyed a little more blue, the orange rays from the blue yarn would not have shown so much on the black.

Another interesting case of deception by the gradual contrast of colors is the following: A lady desiring to purchase some silk ribbon, and being undecided as to which shade to select, had samples of blue, violet and green shown her at the same time. After a close examination of the blue ribbon she turned to look at the violet; to her astonishment it was not violet, but brown. Perfectly correct, from looking at the blue ribbons, the complementary color of the blue—orange—was found in her eye and was imparted to the violet, giving it the appearance of brown. From the violet ribbon she proceeded to examine the green sample. Here she was again deceived, for, from previously looking at the violet, light yellow was imparted to the green, and it had the appearance of being faded. If, after her examination of the blue ribbon, the lady had turned to an orange object, her eye would have been refreshed, and in a fit condition to look at the violet. After finishing with the violet ribbons she should have looked at something light yellow, and then her eye would have been sensitive to the green. Therefore dealers should take pains to always show goods on papers of the complementary colors, *i. e.*, red materials on green paper, etc.

All observations on gradual contrast, according to Sherffer's explanation, produce the following result:—

"That in the first part of the observation of a color, a portion of the cornea of the eye becomes affected and tired by it, and that this tired portion, during the second part of the time (*i. e.*, the time of rest) perceives the complementary."

If purple (red-purple red) is placed beside a brilliant carmine, the first appears darker, less bright, while the latter, on the contrary, becomes brighter, more fiery, almost like vermilion; if, however, the same carmine is placed beside vermilion, the carmine appears darker, that is, less bright; so that in one case the carmine appears fiery like vermilion, while in the other it appears darker purple.

The same takes place with vermilion; it appears alongside of the carmine much lighter, almost orange, puce-colored, but when brought in contact with orange puce it appears darker, carminish. Orange puce, which alongside of vermilion appears yellowish, when in contact with yellow shows reddish. Yellow in contact with orange puce appears yellowish green, and in contact with yellowish green it appears orange. Yellowish green alongside of yellow seems darker, *i. e*, blue, and in contact with blue green, lighter, that is, more yellow. Blue green in contact with yellowish green looks almost blue, and in contact with blue, yellow green. Blue appears violet in contact with blue green, and blue green when in contact with violet.

An additional example of similar contrast is shown in the following: When light gray and dark gray are brought in contact the former appears lighter and the latter darker than they are in reality. Any one can try this by a simple experiment. Take two strips of light gray, and two strips of dark gray paper, and paste one light gray strip in contact with one dark strip, and then

compare them from a short distance. It will soon be found that the light gray strip, which is in contact with the dark gray, appears much lighter than its isolated companion, while the dark gray seems darker, so that, therefore, the gray surfaces appear lighter and darker than in reality. A strong contrast is always noticeable between black and white. A black object on a white ground will appear much larger than it is in reality. For instance, a white stripe on a black surface seems broader than a black stripe on a white surface, although both are of the same width. The phenomena of simultaneous contrast, according to Scherffer, may be physiologically explained as follows:—

"When one of our senses receives a double sensation, one of which is active and strong, while the other is weak, it will be found that the latter is not felt. This must be particularly the case when both impressions are of the same kind, or when a strong effect from an object on one of our senses is followed by another of the same kind, which is milder and weaker."

To test the correctness of the same, let any of the colors be placed upon a rotating disk, or by the method of reflection and transmission by means of a slip of polished glass, and their correctness will at once be recognized. Why more correct views do not prevail, is, I take it, because pupils have been content to be pupils, and not students. They have been too willing to accept the traditions of their fathers rather than give themselves the trouble to stop every now and then, and say, Is this so?

BI-SULPHATE OF SODA FOR ACID COLORS.

Passing attention has been called to this useful product; special attention is worthy of being given to it, as it contains all the good points of Glauber's

salt and sulphuric acid combined. Brilliant black is taken up with it at one pound to one pound of color, and other colors in proportion of from two to four per cent. Additional Glauber's salt can be used with it if required for any acid color.

It will readily be perceived what advantage this has over sulphuric acid in freight and safety as it comes in a dry state, and that so small a quantity will lift brilliant black is also a great advantage to the garment dyer, from the fact that the silk facings, linings, buttons and holes will be less discharged than formerly.

Its price is about $1\frac{3}{4}$ cents per pound.

HOW TO CLEAN DYED HANDS.

Four pounds washing soda, dissolved in stone jar with one gallon boiling water; when cold add one pound chloride of lime; thoroughly mix and cover up. This will last a long time if kept covered up. The hands are washed in the clean liquor, and when the stain has slipped off the liquor can be returned, or the hands can be dipped in the jar, one at a time, then wash in warm water, then in soap.

GLOSSARY.

It may be useful to the uninstructed to have explained to them some of the names and terms used in the trade.

Acetate of Lead.—Sugar of Lead.

Alumina.—A pure form of Alum.

Animalize.—The action of Mordants on cotton fibre causing them to take up dye similar to animal fibres.

Aqua Ammonia.—Liquid Ammonia.

Aqua-fortis.—A weaker form of Nitric Acid.

Bark.—Mostly Quercitron bark.

Catechu.—The proper name for Cutch.

Chemic.—A term used by bleachers for the bleach liquor containing the Indigo for bluing.

Chemic Blue.—Sometimes called by dyers Indigo Paste, or Indigo Extract, all three of which refer to the prepared paste of indigo, as does also Sulphate of Indigo.

Chlorine.—Referring to the bleach liquor made from Chloride of Lime.

Chromate of Lead. — One hundred and ninety parts Chromate of Potash and one hundred parts Sugar of Lead.

Chrome.—An abbreviation for Bichromate of Potash.

Chroming.—The act of preparing goods (Mordanting) for dyeing.

Dishful.—About ten pounds.

Divi Divi.—Similar to Catechu.

Double Muriatic Acid.—A stronger form of Muriatic Acid.

Double Nitric Acid.—A stronger form of Nitric Acid.

Double Tin.—A stronger form of Tin Liquor.

Fah.—Refers to Fahrenheit's instrument to test heat.

Iron, To.—Means to pass through a preparation of Nitric Acid in which iron is dissolved.

Gambier.—Similar to Catechu.

Granulated Tin or *Feathered Tin.*—Block Tin melted, and at a height allowed to fall slowly into a a vessel of water, when it becomes small and thin for tin solutions.

Hypernic.—American name for the family of Brazil wood, Lima wood and Peach wood.

Kettle.—Means any vessel used for dyeing, of whatever material made.

Mac or *Mack.*—For Sumac.

Magenta, *Fuchsine*, and *Roseine.*—Simply a confusion of names, as they are one and the same in manufacture.

Mordant.—When not otherwise defined means to pass through or lie in a preparation of Tannin, for light colors one pound of Tannic Acid, mostly called Tannin, or, as an equivalent, two pounds of Bird's Aniline Mordant, or ten pounds Sumac. In either case to be scalded out before the goods are entered. For dark colors half extra of the Tannin or Aniline Mordant, and often twenty pounds of Sumac are required to one hundred pounds of goods.

Muriatic Acid.—The correct name for Hydrochloric Acid and Spirits of Salts.

Oil Soap.—Preferably made from palm-oil (very good is made from Cotton and Linseed Oils); it has this advantage, that when dissolved it remains so, and is fit for constant use, and especially is it useful for cleaning goods that will not stand warm soap.

Oxidizing.—The air acting on dyed goods and turning them dark.

Pailful.—Three to four gallons.

Panama Bath.—A soap bath with Acetic or Sulphuric Acid in it for dyeing silks.

Prussiate.—Prussiate of Potash either in the red or yellow form.

Sal Soda.—The term used in America for washing Soda.

Soda Ash.—About twice as strong as Sal Soda.

Soda.—The term used in England for washing crystals.

Sour, To.—To pass the goods through an acid bath, mostly sulphuric, to taste just tart, and used warm.

Speck Dyeing.—Filling up cotton warp after woolen dyeing Touching up specks of cotton showing on dyed goods.

Spend.—The act of drawing out the color of dye woods.

Spirit, To.—Sometimes means to pass through a warm bath of Sulphuric Acid, or Spirits of Salts, to clear and heighten the work, or to remove stains from goods that have been cleaned ready for dyeing mostly by garment dyers. To spirit, however, often means to pass through one of the tin liquors after cotton goods have been in a tannin liquor; both of which prepares it for taking up the brighter shades of dyes.

Standard Colors.—Those generally in use and dyed by accepted rule.

Strip.—The act of discharging old dye in goods.

Sulphuric Acid.—The proper name for Oil of Vitriol.

Sulphate of Copper.—The correct name for Blue Vitriol or Bluestone.

Sulphate of Iron.—The correct name for Copperas.

Sulphuring.—The action of Brimstone on the fibre of goods in a bleaching process.

Tot.—Equal to about one-third of a pint.

Tartar.—Sometimes refer to Cream of Tartar and sometimes to Red Argols. They are both the same thing, the white being purified, but for dyeing purposes the best red will generally answer as well as the white.

Tin, To.—To pass the goods through one of the preparations of tin liquor, as Muriate of Tin or Oxymuriate of Tin.

Top off, To.—The act of giving a last dye bath to improve some previous one.

Tw.—Refers to Twaddle's instrument to test the strength of acid and other solutions.

NAPHTHYLAMINE BLACK D.

Patent Applied For.

This new product, belonging to the class of black coloring matters patented by Messrs. Leopold Cassella & Co., of Frankfort-on-the-Main, Germany, possesses the following advantages:—

It is fast to light and milling; it dyes evenly in a neutral bath, and, like naphtol black, it does not rub off.

Up to the present moment the best methods known for dyeing it are as follows:—

Wool is dyed in a neutral or slightly acidulated bath.

For dyeing piece goods and yarn in light shades, it requires an addition of thirty to thirty-five per cent. of common salt to every hundred pounds of wool, or sixty to seventy per cent. of crystalized Glauber salts.

For dark goods it is advisable to use five to seven and one-half pounds of acetic acid per one hundred pounds of wool along with the Glauber salts above mentioned.

Loose Wool is dyed by adding to the dye bath five pounds of alum and fifteen pounds of calcined Glauber salts per one hundred pounds of stock.

In all cases the wool is dyed in the same bath with the mordant, and at the boil, three to four pounds naphthylamine black D. producing a full, deep shade, while the addition of some green, yellow or orange produces a dead or jet black.

Mixed Goods (*cotton or wool*) can be dyed with one part naphthylamine black D. and two parts diamine black R. O., with the addition of Glauber salts. The shade obtained is not exactly a black, but can be made one by topping in a cold bath with fast green O.

Silk is dyed in a boiling bath with the addition of some acetic acid or alum. Seven pounds of naphthylamine black D. produces a fine deep color which resists the action of water and even strong soaping.

Mixed Silk and Wool is dyed in a boiling bath with the addition of about six pounds of acetic acid per one hundred pounds of stock. If alum is used, a deep, dead black is obtained.

N. B.—If tin or copper dye baths or copper piping be used, naphthylamine black must be dyed slightly acid (with acetic or muriatic acid). When dyed in neutral baths in the presence of these metals, the shade is somewhat reddened. When dyed in wooden vessels, neutral baths may be employed without harm, so long as the copper pipes or coils do not come in contact with the goods or yarns.

Naphthylamine black D. of itself is alkaline and should be neutralized in dissolving it with a small addition of muriatic acid or acetic acid.

Sulphate of ammonia may be used where the dyeing is done in copper or tin vessels, and then the addition of acetic or muriatic acid is unnecessary.

Without guarantee.

ALIZARINE BLACK, FOR WOOL ONLY.

The formula given for this is as follows:—

Make up dye bath with four per cent. alizarine 4 B.; acetic acid, ten per cent. Enter at the boil, and continue to boil until the color is taken up.

Samples of this color were received and personal tests were made with it on white yarn. The color is a strong one. The dyed sample came up rather reddish. The second in the same bath, with the same proportions, the same. The third one, in fresh bath, did so also; this, possibly, may be corrected by adding acid green or yellow to it.

DIAMINE FAST COTTON BLACK.

This is an entirely new production, and is mostly applicable to yarn and piece dyeing. It is done in three operations, and a wash-off in soap. Process of dyeing is as follows:—

For one hundred pounds of cotton, dye in bath of ten pounds diamine black E., fifteen pounds common salt, five pounds carbonate soda crystals, boiling for one hour.

This bath can be used for all following dyeings, by adding one-third to one-half of amount of dye for every one hundred pounds cotton, and now and again a fresh quantity of salt and soda. Wash off well with cold water and enter the preparing bath made up with ten pounds nitrate soda, dissolved in cold water, and add gradually while stirring twenty pounds sulphuric acid; work fifteen minutes. Keep

this cool as possible, and do not rake or stir violently, being careful in working to work the goods without churning the bath. Wash off in cold water, *and pass at once* to the developing bath made up with Developer No. 3, ten to fifteen pounds, dissolved in boiling water, and add to the tub; work cold for fifteen or twenty minutes, and then wash well. The preparing and developing baths can be used over and over again by being freshened up with proportionately less quantities. No caustic soda required in the use of Developer No. 3. All were soaped at 190° F., with two pounds of soap to one hundred pounds of yarn.

The above formula was sent me, with dyed samples, by Messrs. Wm. J. Matheson & Co., agents for Leopold Cassella & Co., of Frankfort, Germany. Samples of color were to have been sent in time for my personal tests, but, as they did not reach me up to the last day of going to press, I had no opportunity of doing so. Note from 2 to 3 per cent sulphuric acid is as much as cotton will bear without injury.

ONE-DIP ANILINE FAST BLACK FOR COTTON.

Benzo black blue has been described. The one I now offer is stronger and deeper than that, so much so that most mixed goods after the wool is dyed can be filled up as follows in one bath: To each dress use one and one-half ounces, and a gent's suit two ounces cotton black, and three times as much of common salt, dissolve the color in boiling water, then make the bath stand at about 100° F., and let them lie in this at that heat until the color is on; the same bath, no doubt, can be added to and used from time to time. So if the bath is made stronger it will be no loss, as it can be saved.

The warranted fast cotton hose can be dyed with this at less cost than with the benzo black blue; will therefore take less. Otherwise the operation is the same.

Fulling black on piece goods can also be dyed in same way with this as described for benzo blue black. With one bath of sumac and iron instead of two, with three per cent. color and ten per cent. salt.

FAST ANILINE BLACK FOR MIXED GOODS OF COTTON AND WOOL.

TO DYE IN ONE BATH.

This color has just come to hand, too late, however, to give report of test here.

Will make it shortly and give results to those who wish it.

THE END.

APPENDIX.

RULES FOR CONVERTING AVOIRDUPOIS WEIGHTS AND MEASURES INTO METRIC.

To convert avoirdupois pounds into grammes, multiply by 500, and deduct 10 per cent., and then add 55½ grains for exactness to every 1,000 pounds avoirdupois.

To convert avordupois pounds into half kilos, or pints into half litres, deduct about 10 per cent.

To convert avoirdupois ounces into grammes, multiply by 30 and divide by 5, then add 22 grains to the ounce.

To convert yards into metres, deduct 10 per cent.

The following may be used for mixing:—

One Troy grain or minim is equal to 0.06 gramme or fluidgramme, or 6 centrigrammes.

One drachm or fluiddrachm is equal to 4 grammes or fluidgrammes.

One ounce is equal to 30 grammes.

One gramme is equal to 15 grains or minims.

An average drop is equal to 0.05 fluidgramme.

An average teaspoon holds 5 fluidgrammes.

A dessert spoon 10 fluidgrammes.

A tablespoon 20 fluidgrammes.

A wine glass 75 fluidgrammes.

HYDROMETER TABLES.

Baumé's scale for liquids heavier than water is graduated from 0° to 72°. Its relation to direct specific gravity is shown in the following table:—

0° =	1.000	27° =	1.216	51° =	1.505
3	1.020	30	1.246	54	1.551
6	1.041	33	1.277	57	1.600
9	1.063	36	1.310	60	1.652
12	1.086	39	1.345	63	1.708
15	1.109	42	1.382	66	1.767
18	1.134	45	1.421	69	1.831
21	1.160	48	1.462	72	1.900
24	1.188				

The scale for liquids lighter than water extends from 10° to 40°, the lowest number representing the specific gravity of water, and the higher ones those of lighter liquids.

10° =	1.000	21° =	0.930	31° =	0.874
11	0.993	22	0.924	32	0.869
12	0.986	23	0.918	33	0.864
13	0.980	24	0.913	34	0.859
14	0.973	25	0.907	35	0.854
15	0.967	26	0.901	36	0.849
16	0.960	27	0.896	37	0.844
17	0.954	28	0.890	38	0.839
18	0.948	29	0.885	39	0.834
19	0.942	30	0.880	40	0.830
20	0.936				

Beck's scale, for liquids heavier than water, runs from 1°, which is slightly above the specific gravity of water, to 70°. It is a most inconvenient scale.

1° =	1.0059	25° =	1.1724	48° =	1.3934
2	1.0119	26	1.1806	49	1.4050
3	1.0180	27	1.1888	50	1.4167
4	1.0241	28	1.1972	51	1.4286
5	1.0303	29	1.2057	52	1.4407
6	1.0366	30	1.2143	53	1.4530
7	1.0429	31	1.2230	54	1.4655
8	1.0494	32	1.2319	55	1.4783
9	1.0559	33	1.2409	56	1.4912
10	1.0625	34	1.2500	57	1.5044
11	1.0692	35	1.2593	58	1.5179
12	1.0759	36	1.2687	59	1.5315
13	1.0828	37	1.2782	60	1.5454
14	1.0897	38	1.2879	61	1.5596
15	1.0968	39	1.2977	62	1.5741
16	1.1039	40	1.3077	63	1.5888
17	1.1111	41	1.3178	64	1.6038
18	1.1184	42	1.3281	65	1.6190
19	1.1258	43	1.3386	66	1.6346
20	1.1333	44	1.3492	67	1.6505
21	1.1409	45	1.3600	68	1.6667
22	1.1486	46	1.3710	69	1.6832
23	1.1565	47	1.3821	70	1.7000
24	1.1644				

Cartier's scale for liquids lighter than water runs from 10° = water, to 44°. Its relation to direct specific gravity is shown in the following table :—

10° =	1.000	22° =	0.916	34° =	0.845
11	0 992	23	0.909	35	0.840
12	0.985	24	0.903	36	0.835
13	0.977	25	0.897	37	0.830
14	0.970	26	0.891	38	0.825
15	0.963	27	0.885	39	0.819
16	0.956	28	0.879	40	0.814
17	0.949	29	0.872	41	0.809
18	0.942	30	0.867	42	0.804
19	0.935	31	0.862	43	0.799
20	0.929	32	0.856	44	0.794
21	0.922	33	0.851		

The direct scale of specific gravity assumes water to be 1, or 1.000, all heavier liquids requiring larger numbers, and all lighter ones numbers smaller than unity. This scale shows at once the weight per gallon of any liquid, the first two figures to the left hand representing pounds (avoirdupois), and the two or more following to the right being decimal fractions of a pound. Thus, if a sample of double muriate marks 1.450, a gallon of it weighs 14½ pounds.

Twaddle's scale makes water = 0, and the strongest oil of vitriol = 170°. Unlike direct specific gravity, it extends only to liquids heavier than water. For greater accuracy, the scale is arranged on a set of six instruments, numbered progressively upwards. Thus, a No. 1 Twaddle ranges from 0° to 32°.

The relation between Twaddle's scale and direct specific gravity is very simple. To convert a degree of Twaddle into the corresponding degree of direct specific gravity, multiply by 5, and add 1.000 to the product. Thus, if a bleaching liquor marks 7° Twaddle, its specific gravity is—

7
5
—
35
1.000
———
1.035

A sample of single aqua-fortis marks 33° Twaddle. Its specific gravity is then—

33
5
——
.165
1.000
———
1.165

If the specific gravity has been taken the degree of Twaddle may be found by reversing this rule, subtracting 1.000 and dividing the remainder by 5. Thus, a sample of double aqua-fortis marks specific gravity 1.350. Its degree on Twaddle's scale will be—

1.350
1.000
———
5).350
——
70° Twaddle.

In some hydrometers, graduated for direct specific gravity, the first figure is omitted. On such, water marks 0°, and the above-mentioned sample of double aqua-fortis 350°. A peculiar hydrometer—called the ammonia glass or ammonia meter—is used in some districts for the sale of ammonia. It ranges from 10° (water) to 45°, representing the lightest liquors. It very nearly agrees with Baumé's light glass. Hydrometers give inacurate results if applied to—

a. Hot liquids.

b. Glutinous liquids, solutions of gum, starch, size, etc.

c. Effervescing liquids.

d. Liquids holding solid matters in suspension.

Hot liquids should be allowed to cool, or, if it be necessary to observe their specific gravity at elevated temperatures, a comparative trial should be made on the liquid while hot, and on a portion when cold, so that the indication may be corrected. If it be needful to take the specific gravity of any liquid coming under the heads *b*, *c*, and *d*, a gallon should be accurately weighed.

In chemical, dye, and print works, where hydrometers are placed in the hands of foremen for frequent use, they should be regularly brought at some stated time to the laboratory for verification.

COMPARISON OF THE DEGREES OF BAUMÉ'S AND TWADDLE'S HYDROMETERS, WITH SPECIFIC GRAVITIES.

The specific gravity of liquids is generally noted on the Continent for liquids heavier than water by Baumé's hydrometer, while for liquids lighter than water that of Cartier is mostly employed.

These various scales may be, by certain formulas, converted into each other, but, as practical men generally do not like to trouble themselves with long calculations, but want for their experiments everything as far as possible at their hand, it was thought advisable to give, in the following, these comparative scales in full for liquids heavier than water:—

Baumé.	Specific gravity.	Twaddle.	Baumé.	Specific gravity.	Twaddle.
0	1.000	0	39	1.345	69
1	1.007	1.4	40	1.357	71.4
2	1.013	2.6	41	1.369	73.8
3	1.020	4	42	1.381	76.2
4	1.027	5.4	43	1.395	79
5	1.034	6.8	44	1.407	81.4
6	1.041	8.2	45	1.420	84
7	1.048	9.6	46	1.434	86.8
8	1.056	11.2	47	1.448	89.6
9	1.063	12.6	48	1.462	92.4
10	1.070	14	49	1.476	95.2
11	1.078	15.6	50	1.490	98
12	1.085	17	51	1.505	99
13	1.094	18.8	52	1.520	104
14	1.101	20.2	53	1.535	107
15	1.109	21.8	54	1.551	110.2
16	1.118	23.6	55	1.567	113.4
17	1.126	25.2	56	1.583	116.6
18	1.134	26.8	57	1.600	120
19	1.143	28.6	58	1.617	123.4
20	1.152	30.4	59	1.634	126.8
21	1.160	32	60	1.652	130.4
22	1.169	33.8	61	1.670	134
23	1.178	35.6	62	1.689	137.8
24	1.188	37.6	63	1.708	141.6
25	1.197	39.4	64	1.727	145.4
26	1.206	41.2	65	1.747	149.4
27	1.216	43.2	66	1.767	153.4
28	1.225	45	67	1.788	157.6
29	1.235	47	68	1.809	161.8
30	1.245	49	69	1.831	166.2
31	1.256	51.2	70	1.854	170.8
32	1.267	53.4	71	1.877	175.4
33	1.277	55.4	72	1.900	180
34	1.288	57.6	73	1.944	188.8
35	1.299	59.8	74	1.949	189.8
36	1.310	62	75	1.974	194.8
37	1.321	64.2	76	2.000	200
38	1.333	66.6			

From the specific gravity of a liquid given in the above table its weight per gallon may be easily calculated, as the first two figures from the left hand stand for pounds, while the next preceding ones give the decimal fractions of a pound; for instance, if the specific gravity of hydrochloric acid is 1.160, a gallon of it will weigh 11.6, or rather more than 11½ pounds.

Now a few words about the use of the hydrometer may not be out of place. As important as the gauge glasses are, still among practical men in this country, they are frequently misused. First of all the hydrometer of whatever scale it may be ought never to be used for hot liquids; it is useless for liquids which contain solid matter in suspension, and also for liquids of a sticky nature. Further, the hydrometer never gives a proof of the superiority of one liquid over the other (as long as equal purity has not been previously shown), but merely its specific gravity; hence, if we meet one liquid marking heavier on Twaddle than another, this would be no proof that the former is more valuable, as for instance, hydrochloric acid, standing 34° T., may be under some circumstances inferior to one standing 26°. Lastly, before using, the hydrometer ought to be quite dry.

THERMOMETER SCALES.

To convert Centigrade (Celsius) *into Fahrenheit.*—If the temperature be above the freezing point of water (32° F. = 0° C.), multiply by 9, divide by 5, and add 32 to the quotient. If it be below freezing point (32° F. = 0° C.), but above 0° F. (= — 18° C.), multiply by 9, divide by 5, and subtract the result from 32°. If below — 18° C. (= 0° F.), multiply by 9, divide by 5, and subtract 32° from the result.

Réaumur's scale, in which the boiling point of water is made 80°, and the freezing point, as in the Centigrade, 0°, is still used in many German dye and print works.

To convert Réaumur into Centigrade, whether above or below freezing point, multiply by 5 and divide by 4.

To convert Centigrade into Réaumur, multiply by 4 and divide by 5.

To convert Réaumur into Fahrenheit, or *vice versa*, the rules above given for the conversion of Centigrade into Fahrenheit, etc., will apply, 4 being used respectively as multiplier or divisor instead of 5.

COMPARISON OF THE DEGREES OF FAHRENHEIT, CENTIGRADE, AND RÉAUMUR THERMOMETERS.

The difference in the scales of the termometers in general use is frequently a mystery to practical men. Why the degrees as shown on Fahrenheit's, Centigrade, or Réaumur's thermometers should be different they cannot well conceive when they come to think about them. It may, therefore, be interesting to explain this matter.

In all the thermometers, whether made after the system of Fahrenheit, Celsius, or Réaumur, the degrees commence at a point called zero, which always indicates a great degree of cold, and rise to warmer points with varying degrees of rapidity. Celsius and Réaumur commenced at the freezing point of water, and called this zero, and made respectively 100° and 80° between this point and the boiling point of water. From the fact that Celsius divided the distance between the freezing and the boiling points of water into 100°, his thermometer has been called the Centigrade, and has come into general use in France, where the decimal system has found so much favor.

Into all the facts respecting the gradation of thermometers it is unnecessary to enter; suffice to say that investigations, which have been most carefully made, show the natural zero of Fahrenheit's scale to be—461° 2′, Centigrade—274°, and Réaumur's, 219° 2′. These remarks show the difference between the scales of each thermometer, and the systems on which they are constructed.

For all ordinary purposes, experience has shown that the scale of Fahrenheit is to be preferred to that of the Centigrade, from the fact that each degree indicates a much smaller range of temperature.

Fahrenheit.	Celsius or Centigrade.	Réaumur.	Fahrenheit.	Celsius or Centigrade.	Réaumur.
+212	+100	+80	+170	+76.67	+61.33
211	99.44	79.56	169	76.11	60.89
210	98.89	79.11	168	75.55	60.44
209	98.33	78.67	167	75	60
208	97.78	78.22	166	74.44	59.56
207	97.22	77.78	165	73.89	59.11
206	96.67	77.33	164	73.33	58.67
205	96.11	76.89	163	72.78	58.22
204	95.55	76.44	162	72.22	57.78
203	95	76	161	71.67	57.33
202	94.44	75.56	160	71.11	56.89
201	93.89	75.11	159	70.55	56.44
200	93.33	74.67	158	70	56
199	92.78	74.22	157	69.44	55.56
198	92.22	73.78	156	68.89	55.11
197	91.67	73.33	155	68.33	54.67
196	91.11	72.89	154	67.78	54.22
195	90.55	72.44	153	67.22	53.78
194	90	72	152	66.67	53.33
193	89.44	71.56	151	66.11	52.89
192	88.89	71.11	150	65.55	52.44
191	88.33	70.67	149	65	52
190	87.78	70.22	148	64.44	51.56
189	87.22	69.78	147	63.89	51.11
188	86.67	69.33	146	63.33	50.67
187	86.11	68.89	145	62.78	50.22
186	85.55	68.44	144	62.22	49.78
185	85	68	143	61.67	49.33
184	84.44	67.56	142	61.11	48.89
183	83.89	67.11	141	60.55	48.44
182	83.33	66.67	140	60	48
181	82.78	66.22	139	59.44	47.56
180	82.22	65.78	138	58.89	47.11
179	81.67	65.33	137	58.33	46.67
178	81.11	64.89	136	57.78	46.22
177	80.55	64.44	135	57.22	45.78
176	80	64	134	56.67	45.33
175	79.44	63.56	133	56.11	44.89
174	78.89	63.11	132	55.55	44.44
173	78.83	62.67	131	55	44
172	77.78	62.22	130	54.44	43.56
171	77.22	61,78	129	53,89	43.11

Fahrenheit.	Celsius or Centigrade.	Réaumur.	Fahrenheit.	Celsius or Centigrade.	Réaumur.
+128	+53.33	+42.67	+79	+26.11	+20.89
127	52.78	42.22	78	25.55	20.44
126	52.22	41.78	77	25	20
125	51.67	41.33	76	24.44	19.56
124	51.11	40.89	75	23.89	19.11
123	50.55	40.44	74	23.33	18.67
122	50	40	73	22.78	18.22
121	49.44	39.56	72	22.22	17.78
120	48.89	39.11	71	21.67	17.33
119	48.33	38.67	70	21.11	16.89
118	47.78	38.22	69	20.55	16.44
117	47.22	37.78	63	20	16
116	46.67	37.33	67	19.44	15.56
115	46.11	36.89	66	18.89	15.11
114	45.55	36.44	65	18.33	14.67
113	45	36	64	17.78	14.22
112	44.44	35.56	63	17.22	13.78
111	43.89	35.11	62	16.67	13.33
110	43.33	34.67	61	16.11	12.89
109	42.78	34.22	60	15.55	12.44
108	42.22	33.78	59	15	12
107	41.67	33.38	58	14.44	11.56
106	41.11	32.89	57	13.89	11.11
105	40.55	32.44	56	13.33	10.67
104	40	32	55	12.78	10.22
103	39.44	31.56	54	12.22	9.78
102	38.89	31.11	53	11.67	9.33
101	38.33	30.67	52	11.11	8.89
100	37.78	30.22	51	10.55	8.44
99	37.22	29.78	50	10	8
98	36.67	29.33	49	9.44	7.56
97	36.11	28.89	48	8.89	7.11
96	35.55	28.44	47	8.33	6.67
95	35	28	46	7.78	6.22
94	34.44	27.56	45	7.22	5.78
93	33.89	27.11	44	6.67	5.33
92	33.33	26.67	43	6.11	4.89
91	32.78	26.22	42	5.55	4.44
90	32.22	25.78	41	5	4
89	31.67	25.33	40	4.44	3.56
88	31.11	24.89	39	3.89	3.11
87	30.55	24.44	38	3.33	2.67
86	30	24	37	2.78	2.22
85	29.44	23.56	36	2.22	1.78
84	28.89	23.11	35	1.67	1.33
83	28.33	22.67	34	1.11	0.89
82	27.78	22.22	33	0.55	0.44
81	27.22	21.78	32	0	0
80	26.67	21.33	31	—0.55	—0.44

Fahrenheit.	Celsius or Centigrade.	Réaumur.	Fahrenheit.	Celsius or Centigrade.	Réaumur.
+30	—1.11	—0.89	—6	—21.11	—16.89
29	1.67	1.33	7	21.67	17.33
28	2.22	1.78	8	22.22	17.78
27	2.78	2.22	9	22.78	18.22
26	3.33	2.67	10	23.33	18.67
25	3.89	3.11	11	23.89	19 11
24	4.44	3.56	12	24.44	19.56
23	5	4	13	25	20
22	5.55	4.44	14	25.55	20.44
21	6.11	4.89	15	26.11	20.89
20	6.67	5.33	16	26.67	21.33
19	7.22	5.78	17	27.22	21.78
18	7.78	6.22	18	27.78	22.22
17	8.33	6.67	19	28.33	22.67
16	8.89	7.11	20	28.89	23.11
15	9.44	7.56	21	29.44	23.56
14	10	8	22	30	24
13	10.55	8.44	23	30.55	24.44
12	11.11	8.89	24	21.12	24.89
11	11.67	9.33	25	31.67	25.33
10	12.22	9.78	26	32.22	25.78
9	12.78	10.22	27	32.78	26.22
8	13.33	10.67	28	33.33	26.67
7	13.89	11.11	29	33.89	27.11
6	14.44	11.56	30	34.44	27.56
5	15	12	31	35	28
4	15.55	12.44	32	35.55	28.44
3	16.11	12.89	33	36.11	28.89
2	16.67	13.33	34	36.67	29.33
1	17.22	13.78	35	37.22	28.78
—0	17.78	14.22	36	37.78	30.22
1	18.33	14.67	37	38.33	30.67
2	18.89	15.11	38	38.89	31.11
3	19.44	15.56	39	39.44	31.56
4	20	16	40	40	32
5	20.55	16.44			

FRENCH MEASURES OF CAPACITY.

	Eng. cub. inches.		Imp. Measure. gal.	pint.
Millilitre	.061028			
Centilitre	.61028			
Decilitre	6.1028			
Litre*	61.028	=	0	1.76
Decalitre	610.28	=	2	1.60
Hectolitre	6102.8	=	22	0.08
Kilolitre	61028.	=	220	0.80
Myriolitre	610280.	=	2201	

*A cubic decimetre.

FRENCH MEASURES OF WEIGHTS.

	Eng. grains.		Troy Weight. lb.	oz.	dwt.	gr.
Milligramme	.1540					
Centigramme	.1543					
Decigramme	1.5434					
Gramme*	15.4340					
Decagramme	154.3402	=	0	0	6	10.46
Hectogramme	1543.4023	=	0	3	4	8.4
Kilogramme	15434.0234	=	2	8	3	12.02
Myriogramme	154340.2344	=	26	9	15	0.24

A kilogramme is 2¼ pounds avoirdupois.

*A gramme is the weight of a cubic centimetre of water.

BENZINE

OR

Dry Cleaning Soap.

It is superior to Castile, being FREE from any offensive smell; will keep SWEET any length of time; is NEUTRAL, therefore will not injure any color; will dissolve perfectly in Benzine. Fifty lb. box sent C. O. D. Price per pound, 10 cents. CARRIAGE PAID. Don't lay this aside, but order at ONCE for TRIAL before you are out of present stock. Sample free.

PURE OIL SOAP STOCK.

This is the best Soap ever made FOR ALL SCOURING PURPOSES. It is NEUTRAL, therefore will not injure any color; is PERFECTLY SWEET and leaves NO ODOR IN GOODS. It has not a PARTICLE of adulteration and is Pure White. Made expressly for the DYER AND CLEANER, AND FOR LAUNDRY PURPOSES. Dissolves at boiling point in 10 minutes. Dissolves at 110° F. in one hour. Will keep liquefied at 75° F. Contains not a particle of Lard or Cotton Seed Oil. WILL DO DOUBLE THE WORK OF OTHER SOAPS.

In bbls, about 300 lbs., price 5 cents per lb.

SOLD ON ITS MERITS.

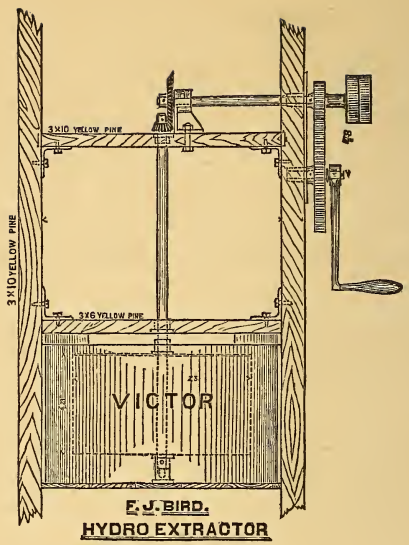
Manufactured by

F. J. BIRD,

2106 COLUMBIA AVENUE,

Philadelphia, Pa.

When Ordering say if for Hand or Steam Power, as Pullies are left off for Hand Power.



Machine is sent complete for the price named.
Uprights of large one are 12 x 3.
" small " 10 x 2½.
Length of uprights is 10 feet.

Worked by Hand or Power.

A good reliable Whizzer to work by hand has been much sought after. Several attempts have been made in this direction, but no machine has before been produced that runs easy enough for a boy to use. This one is cheap enough to come within the means of everyone and so simple that it does not get out of order. It can be fixed by any one perfectly solid.

This Machine we now offer. It is made of Galvanized Iron, so never rusts.

It is so perfectly adjusted that it does not oscillate.

The cogs, etc., are made of cast steel so are not liable to break.

Every part is numbered, so they can be duplicated at any time.

PRICE:

No. 1. Inside measurement of basket, 24 inches, $50.00

This size is large enough for nearly all purposes, as it will take from six to nine suits of clothes at a time. Weight, 300 pounds.

No. 2. Inside measurement of basket, 30 inches, $75.00

Weight of No. 2 is 400 pounds.

Same price for Steam or Hand Power.

Manufactured and sold by

F. J. BIRD,
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Neutral or Sweet Colors for Garment Dyers.

SOLD BY F. J. BIRD.

Fuchsine, best crystals,	$1 25
Chrysoidine, Y or R,	75
Neutral Cardinal, darker and yellower than fuchsine,	1 15
Garnet, darker than cardinal,	1 25
Bismarck, red or yellow,	75
Neutral Brown,	1 10
Seal Brown,	1 25
Brilliant Green, (neutral),	1 25
Violet,	1 50
Olive Green,	1 25
Bronze Green,	1 25
Plum Color,	1 50
Bright Blue, on green or red shade,	1 50
Will dye from 4 B to dark shade.	
Navy Blue,	1 50

All the above will dye on silk and wool. Cotton must be mordanted.

ACID FAST COLORS FOR SILK AND WOOL.

Scarlet, any shade,	$ 50
Cardinal, has no equal,	75
Canary Color,	1 00
Strong Yellow,	75
Orange, any shade,	50
Wine Color,	75
Mahogany and Terra Cotta,	75
Garnet,	75
Green, fine shade,	1 25
Medium and Bottle Green,	1 25
Olive and Bronze Green,	1 00
Blue, 4 B shade,	1 50
Navy, any shade,	1 50
Golden Brown (fine),	1 00

This is an extraordinary good thing, as it will dye a fine tan color, golden brown, medium brown, down to a full yellow shade of seal brown. Please try it.

Fast Black for Wool. Fast Black for Mixed Goods.
Fast Black Cotton. Fast Black for Silk.

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AMERICAN

PRACTICAL DYER'S COMPANION;

COMPRISING

A Description of the Principal Dye-Stuffs and Chemicals used in Dyeing, their Natures and Uses; Mordants, and how Made;

WITH

THE BEST AMERICAN, ENGLISH, FRENCH, AND GERMAN PROCESSES FOR BLEACHING AND DYEING SILK, WOOL, COTTON, LINEN, FLANNEL, FELT, DRESS GOODS, MIXED AND HOSIERY YARNS, FEATHERS, GRASS, FELT, FUR, WOOL, AND STRAW HATS, JUTE YARN, VEGETABLE IVORY, MATS, SKINS, FURS, LEATHER, ETC., ETC.

BY WOOD, ANILINE AND OTHER PROCESSES,

TOGETHER WITH

REMARKS ON FINISHING AGENTS AND INSTRUCTIONS IN THE FINISHING OF FABRICS, SUBSTITUTES FOR INDIGO, WATER-PROOFING OF MATERIALS, TESTS AND PURIFICATION OF WATER, MANUFACTURE OF ANILINE AND OTHER NEW DYE WARES, HARMONIZING COLORS, ETC.;

EMBRACING IN ALL

OVER EIGHT HUNDRED RECEIPTS FOR COLORS AND SHADES, ACCOMPANIED BY ONE HUNDRED AND SEVENTY DYED SAMPLES OF RAW MATERIALS AND FABRICS.

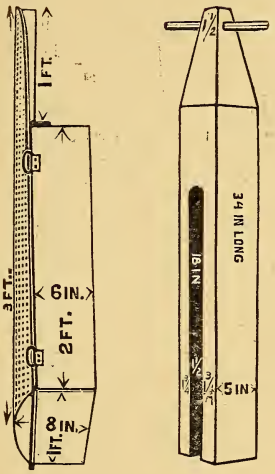
BY

F. J. BIRD,

PRACTICAL DYER,

AUTHOR OF "THE DYER'S HAND-BOOK."

$10.00.



The Punch here shown, as used both for wet and dry cleaning, is made of lance, poplar or any white wood; the size indicated is the most useful.

The slot, as shown on one side, is cut out on all sides, and the corners slightly rounded at bottom so they don't cut.

The Steam Kettle will do made of tin, zinc or copper. The top can be made to lift off. Underneath, just where the lid begins to extend over kettle, a flange is raised on kettle 1 inch to meet flange on lid that exactly meet each other; this shuts off the steam, which then passes over the flange into the extension, on which plush or velvet pieces can be steamed. It has two handles on each side to carry it with.

CURLING KNIFE.

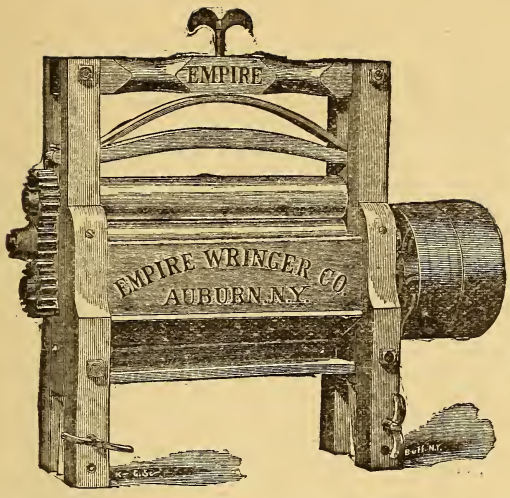
The cut shows about one-half regular size. It can be had from Strunk & Vansant, 702 Arch Street, who are the most popular dyers to the trade; are quite conversant with their work, and can with pleasure recommend them as being first class in every respect. They work for over half the trade of Philadelphia.

ADVERTISEMENTS.

A Word in Reference to Same.

Only reliable houses have been admitted, who can be depended upon for such goods the cleaner, dyer and finisher always require in the business.

In reference to machinery, etc., required, if any of my readers desire my personal inspection of any orders, if sent to me I will place them in good hands for best work at reasonable prices, and see that they are executed properly.



MADE EXPRESSLY FOR

Dyers and Cleaners, Hotels and Laundries.

The Wringers have our Purchase Gear, by which an equal quantity of work can be accomplished with *half the labor* required by any other Wringer, and the wear of the rolls greatly lessened.

Our Purchase Gear applies the power by means of a small gear-wheel on the crank to larger gear-wheels on the rolls, a mechanical device which *doubles* the power applied, and *saves half the labor* in wringing the clothes; and by having the crank on a separate gear the power is applied evenly to both rolls, and they last much longer, for when the crank is attached to the shaft of either roll, that roll wears out long before the other.

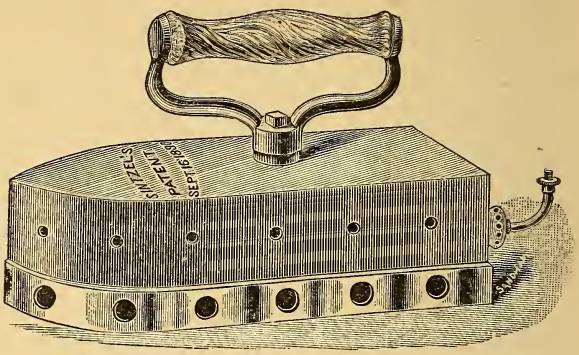
Only the best materials are used in our Wringers, and they are guaranteed against defects. If made with tight and loose pulleys, they are 9 inches diameter, 3¼ inch face.

This size is made with pulleys for power, as shown above, or with crank, only; also a larger size is made with rolls 16 x 21½ inches, for extra heavy work.

Size 14.	Rolls 14 x 2¼, (crank)	$14 00
"	" " (pulleys)	17 00
Size 16.	Rolls 16 x 2½, (crank).....	18 00
"	" " (pulleys)	21 00

Having tested for some years this Wringer. I can challenge the world for its equal, F. J. BIRD will send it safely packed on receipt of price or C. O. D.

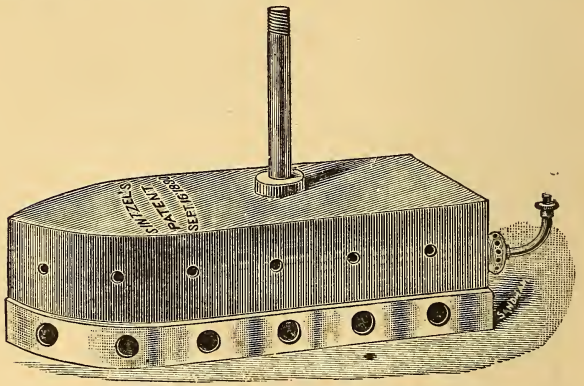
The "Perfection" Gas Sad Iron.



STYLE B, C AND D. (Tailors' Iron).

Style B, face $3\frac{5}{8}$ x $10\frac{1}{4}$; weight, complete, 17 lbs.
Style C, face $8\frac{5}{8}$ x $10\frac{1}{4}$; weight, complete, 20 lbs.
Style D, face $3\frac{5}{8}$ x $10\frac{1}{4}$; weight, complete, 25 lbs.

Price, complete, with six feet of tubing, $10.00. If for hand work, stand will be furnished.



STYLE A. (Machine Iron).

Size of face $3\frac{5}{8}$ x $12\frac{1}{4}$ inches; weight 13 lbs. This style can also be furnished for hand work at same price as B, C and D Iron.

Price, complete, with six feet of tubing and stand for Iron as per page 11, $10.00.

As a Machine Iron this is without a competitor. No time is lost by Iron getting cool, as any heat desired can be obtained. The cost of gas consumed for ten hours work is only six cents (gas to cost $1.50 per 1,000).

Special Notice.

THE "PERFECTION" GAS SAD IRONS are guaranteed the most practical and economical on the market. Three minutes after being ignited they are ready for use. With the burners used, all soot and dirt is entirely done away with. The cost of gas used for ten hours is six cents (gas to cost $1.50 per 1,000).

By our patented process of heating we got one-third more heat than can be obtained by any other manner. All Irons have full nickeled face, so that trouble in regard to rust is entirely overcome. The attachment is of the simplest kind; we furnish six feet of tubing, with brass sockets on each end. Where the gas cannot be regulated above, we furnish stop cocks on Irons at an extra cost of 50 cents.

We guarantee entire satisfaction, and *responsible* parties can have goods on trial.

The Blackhall Mfg. Company,

Buffalo, N. Y.

An Automatic Pressing Machine, as, also Hatters and Cloak and Mantle Irons are made by this Company. All of which can be recommended and supplied at list-price by F. J. BIRD.